WATER RESOURCES

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EIGHTY-SIXTH CONGRESS

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CONTENTS

	Page
Andrews, Leon, taxpayer	945
Banks, Harvey O., director, State department of water resources	693
Barnes, John S., State conservationist, Soil Conservation Service, California	727
Blatz, Harold B., president, California Association of Soil Conservation Districts	951
Bold, Frederick, Jr. attorney	804
Bookman, Max, executive committee, Southern California Water Coordinating Conference	911
Bottorff, Allen, chairman, Water Problems Department, Kern County Farm Bureau	934
Break, S. Wesley, chairman, Board of Supervisors, San Bernardino County, Calif	889
Brown, Hon. Edmund G., Governor, State of California	758
Bryant, John, chief engineer, Riverside County Flood Control and Water Conservation District	899
Carlson, Thomas M., attorney	796
Carr, James K., chairman, California Water Commission	929
Charts:	
Los Angeles:	
Areas in San Joaquin and Sacramento valleys	faces 722
Commercial recoveries of marked salmon	871
Metropolitan Water District	faces 852
Possible water development for salmon stream	874
Salmon spawning tributaries	876
Staging of major projects	704a
State Water resources development system	faces 722
Water development with provisions for wildlife	873
Water development without provisions for wildlife	872
Sacramento:	
Control of our water resources	794
States adopting resolutions to enact water rights legislation	795
States formed from public domain lands	793
Cobey, James A., State Senator of California	769
Cooper, Vincent T., assistant general manager, County Supervisors Association of California	783
Crooke, Howard W., Orange County Water District and Board of Supervisors	896
Denbo, R. F., manager, Eureka Chamber of Commerce and Humboldt County Board of Trade	797
Dorsey, Arthur L., chief, California Division of Soil Conservation	951
Dugan, Hugh P., regional director, Bureau of Reclamation	722
Engle, Hon. Clair, U.S. Senator from the State of California	692, 842
Glass, Mrs. Richard, State water chairman, League of Women Voters of California	901
Goodcell, Rex B., representing the Feather River Project Association	877, 907
Hanna, Edward R., vice president, board of directors, Santa Clara-Alameda-San Benito Water Authority	815
Henderson, George L., National Reclamation Association, Agricultural Research Committee	923
Hill, Clair A., consulting civil engineer	813
Huberty, Martin R., director, University of California Water Resources Center	781
Hunter, Ray, director, natural resources, California Farm Bureau Federation	788

	Page
Issel, George, Aquatic Resources Committee	813
Jensen, Joseph, chairman, board of directors, Metropolitan Water District, Southern California	843
Kronick, Stanley, president, State reclamation board, accompanied by A. N. Murray, chief engineer	717
Kuchel, Hon. Thomas H., U.S. Senator from the State of California	688
Lindsay, Francis C., Northern California Soil Conservation District	775
Linsley, Ray K., executive head, civil engineering, chairman, Committee on Water Resources, Stanford University	773
Lowrey, Lloyd, chairman, Assembly Committee on Natural Resources, Planning, and Public Works, California Legislature	777
Luthin, John C., chairman, California section, American Water Works Association	942
Mangold, Fritz, executive secretary, Sports Council, Inc., Los Angeles, Calif	943
McDonald, Robert, Brig. Gen., Army Engineers Corps	734
Merrill, Malcolm, H., M.D., director, California Department of Public Health	772
Miller, George, State Senator of California	801
Morris, Samuel B., Department of Water and Power, Los Angeles, Calif	948
Morris, Samuel, by Goodcell, Rex B., Jr., assistant attorney, Los Angeles, Calif	877
Nelson, DeWitt, director, Department of Natural Resources, California	708
O'Sullivan, Virgil, State Senator of California	757
Peterson, William S., general manager and chief engineer, Los Angeles Department of Water and Power, letter from, to Senator Kuchel	877
Porter, Carley V., assemblyman	886
Radford, Robert, chairman, Los Angeles County Watershed Commission	883
Reinke, E. A., chief sanitary engineer, California Department of Public Health	772
Reber, John, San Francisco, Calif	818
Reich, William, California Farm Research and Legislative Committee	806
Richards, Richard, State senator, State of California	905
Riess, Stephan, Board of Supervisors, County of Santa Barbara	891
Salsbury, M. E., chief engineer, Los Angeles County Flood Control District, letter from, to Senator Kerr	947
Teale, Stephen P., chairman, California Senate Factfinding Commission on Water	712
Van Overbeek, Mrs. Johannes, legislative water consultant, League of Women Voters, California	785
Vial, Don, California State Federation of Labor, AFL–CIO	918
Warne, William E., director, State department of fish and game	858
Weber, Charles M., M.C.E., Weber Foundation Studies	808
Will, J. G., representing Arizona	928

WATER RESOURCES

THURSDAY, OCTOBER 15, 1959

U. S. SENATE,
SELECT COMMITTEE ON NATIONAL WATER RESOURCES,
Sacramento, Calif.

The select committee met at 9 a.m., pursuant to call in room 4230, State Capitol Building, Sacramento, Calif., Senator Robert S. Kerr (chairman) presiding.

Present: Senators Kerr, Engle, Kuchel, and Young.

Present also: Theodore M. Schad, staff director of the select committee, and Paul McBride, chief clerk.

The CHAIRMAN. I am very happy that this hearing is being held here in California, which I have learned since my arrival here is quite a State.

Your Governor asked me what I thought of California and I told him frankly that I have had a very high regard for it, some 400,000 of Oklahomans, my constituents, had come here apparently of their own free will and accord, and I have been out here a few times in the past years, feeling that I ought to invite them back or assure them, many of them, that had they stayed there and stood trial they would have had a pretty good chance of coming out with life.

I have found an amazing lack of desire on their part to have any provision made for any special treatment of them should they come back and since they not only came here of their own free will and accord but now stay here in spite of numerous advances to them to return, I have no choice other than to have a very high regard and high respect for the State of California.

Senator KUCHEL. Thank you, sir.

The CHAIRMAN. I was here in 1950, holding hearings for the Public Works Committee, and your press at that time asked me what position I thought California would have in the national census with relation to other States and I told them undoubtedly they had reached the point of being in second place. They asked me what I thought of the future census. I said, "I think by 1960 or shortly thereafter California will be in first place. I think they will hold it through 1970 and then, of course, be back in second place in 1980."

Well, they thought I was talking about what Oklahoma was going to do. I told them no, I thought Texas would be in first place in 1980. I find an amazing tendency for agreement with that statement when I go to Texas.

It is marvelous to be here with your two distinguished U.S. Senators. I am not sure but what your Senator is the ablest Republican in the Senate.

I am not in position to say that your junior Senator is the ablest Democrat in the Senate. But I want to say this, that outside the single exception I would know of none greater.

We are here to learn what we can about water in California. We think that your State is in the very front rank of the States in the matter of developing its water resources, in developing its understanding of the value of water, and in appreciating the necessity for conservation. It is our job to find out what the growing population is going to need in the way of their utilization of water resources, the amount that is going to be needed, where that amount of water can be obtained, and how and what is the best means of being sure that it is available, both from the standpoint of the economics and also the abatement of pollution, the conservation of both surface water, the exploration for and finding and utilization of subsurface water and even the desalination of sea water.

It is our custom in each State to have the two Senators make such statement as they care to and then for the senior Senator in conjunction with the junior Senator to call such witnesses as they want to have appear before us.

It happens that your senior Senator is the vice chairman of this committee. Due to some necessity for my being in Oklahoma, I must leave during the day, and after that time he will preside at the hearings of the committee.

Again I want to tell you how glad I am to be here, how glad I am the committee is here, and how happy I am that our great colleague from North Dakota, Senator Milton Young, one of the ablest men in the Senate, is here with us. He might not agree with my statement of the possibility of who is the greatest Republican in Senate. I will say this, I know of no Republican in the Senate who would have more cause to find some fault with that statement than Senator Young, who is one of our great Senators from North Dakota.

Senator Kuchel, I would like for you and Senator Engle to make such statements as you care to and then I would like you to call such witnesses as you care to.

STATEMENT OF HON. THOMAS H. KUCHEL, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator KUCHEL. Let me say by introduction if this meeting this morning were to be held in one of the great cities of North Dakota the description which the chairman used with respect to the senior Senator from California would then have been transferred bodily over to fit the able Republican Senator from North Dakota, Mr. Young.

The CHAIRMAN. Will the Senator yield right there?

Senator KUCHEL. No, I will not yield.

The CHAIRMAN. I greatly urge that you yield just one second, if you would.

Senator KUCHEL. I yield to my friend.

The CHAIRMAN. I would hope you would not carry that line of thought too far because I would be in hope that if you come to Oklahoma you would say some kind words about the senior Senator from Oklahoma and I would not want you to lay a predicate here for the

belief on the part of anyone that there would be any lack of sincerity on the part of any Senator in what he said about the resident Senator in any State.

Senator KUCHEL. I am grateful and I must say that for myself and my friend, the able junior Senator from California, Clair Engle, we are delighted and honored to have here today a distinguished U.S. Senator, the chairman of the committee before us, and a very fine and very able Senator from North Dakota, Milton Young, likewise a member of this committee, to sit here today and to sit tomorrow in Los Angeles in the discharge of its responsibilities given to it by the last session of the Senate.

The United States, through exercise of ingenuity and energy, is in the forefront around the world in undertakings to rectify shortcomings of nature.

This hearing of the Senate Select Committee on National Water Resources is intended to appraise our needs and to gage our capacities and potentials so that this Nation can go forward with measures and plans which will be most effective in making up for maldistribution of water and in averting prospective shortages liable to hinder our future growth and development.

Possibly the major contribution this committee can make toward charting a course for the future will be in recommending measures which will bring closer integration and more productive cooperation between the many agencies of the Federal Government dealing in a variety of ways with water. We hope, also, to suggest means of ending rivalaries and jealousies among States, and to avoid repetitions of the controversies such as that between California and Arizona which regrettably hamper growth and complicate constructive procedures to overcome mutual problems.

I welcome all of you in attendance because the U.S. Senate, in creating this committee recognized the urgency and the importance of obtaining firsthand information and views essential to the adoption of policies, the creation of governmental machinery, and the formulation of programs which together will assure that our civilization does not disappear as did that Babylonian society which centuries ago flourished in the Tigris and Euphrates valleys.

The United States, for more than a half century, has created an astounding array of engineering wonders in the shape of reclamation projects. In more recent decades, under the leadership of the Federal Government, many sections of our Nation, notably our Central Valley of California and the Lower Colorado River Basin, have become the site of great multipurpose projects. These systems harness rivers and supply the foundation of stable agricultural and industrial economies through controlled water and dependable hydroelectric power.

However, as we move into the atomic and nuclear era, as our population mounts by leaps and bounds, as technology and science lead to miracles of production we have realized the very real danger of running out of water. As happened with boundless prairies, huge herds of wild game, vast forests of virgin timber, consumption and usage have produced an undeniable threat of acute scarcity unless bold new steps are taken to bring about more efficient conservation and better utilization of this vital resource. With water, the danger is heightened by profligate poisoning and polluting of streams and lakes.

This committee has been chosen to assemble facts about our present and forseeable resources, to catalog the needs and requirements, to analyze potential means of reconciling the supplies and the demands, and to make recommendations which will achieve a balance. We also are expected to consider practicable problems of Federal, State, and local cooperation. We have realized already, although these hearings began only a week ago, the laws of our Nation involving water must be clarified.

The importance of coordinating Federal activities and agencies is not new. But our explosive rate of national expansion means the United States can no longer afford the luxury of squabbles and jealousies and vendettas between the several units of the executive branch regarding who has jurisdiction over or responsibility in the field of water conservation and utilization.

A forward step was taken only a few months ago when the Army's Corps of Engineers and the Interior Department's Bureau of Reclamation reached an agreement on a formula for development of the Central Valley. Under this written memorandum, each agency is assigned the duty of planning, building, and operating dams and reservoirs still to be constructed. There is room for much more progress along this line.

The imperative nature of this need has been known for some time. Indeed, in two recent administrations, under Presidents of both our great political parties, intensive studies were conducted by detached, informed, competent, special commissions into the requirements for better governmental organization and forward looking policies and programs.

It should be recalled in connection with the hearings this committee now is conducting that the so-called Cooke Commission, in the administration of President Truman, took a comprehensive inventory and came forward with recommendations for development, conservation, and utilization of our water resources on the basis of basinwide undertakings. Likewise, we should remember that a task force of the Commission led by former President Herbert Hoover pointed out how great efficiency and substantial economies would result from intragovernmental transfer of functions and duties.

The Hoover Commission, for instance, advocated a nine-point national water policy involving such items as economic feasibility, rate regulation, States rights, and coordinated planning. Its task force headed by former Governor Miller of Wyoming stressed the essentiality of more adequate basic data programs in order to assure sounder programs and called for unified responsibility for multiple-purpose river basin development.

The Cooke Commission, in like fashion, emphasized the need for including geologic, hydrologic, climatic, land and soil analyses and economic data in planning future developments. This body also directed attention to the growing seriousness of stream pollution, with its concomitant adverse effects on recreation and fish and wildlife.

Both of these advisory groups raised questions about the financial basis on which additional projects should be undertaken. With our Federal debt now at a new peak and Congress just having authorized another unprecedented ceiling, this aspect of our policies and programs—although not a prime responsibility of this committee—cannot be ignored.

The sponsors of the resolution establishing this committee were not unmindful of these Commission studies in the past decade and a half. Rather, they recognized that virtually nothing has been done to translate meaningful recommendations into statutes and policy. They felt the time now has arrived for Congress to take the initiative and to see that affirmative action is taken so more precious time is not lost in facing up to and solving the problems.

Among the reasons they cited for creating this select committee were the mounting cost of obtaining water of suitable quantity, the pressing nature of the pollution problem and the possibility that science can increase usable supplies through desalination, seepage control, wastewater salvage, and weather modification. Just as responsibility is scattered through many units in the executive branch, so in Congress numerous committees have jurisdiction over legislation involving these aspects of our water problems and their solution.

In the same way our Nation is a pacemaker in engineering in water project conception and creation, California is well in the van of the States endeavoring to plan better use of its own resources.

Through our comprehensive State water plan, we have inventoried our existing and probable supplies and we have sketched means of deriving maximum benefits from them. A vast portion of our State already is indebted to the vision, the courage, and the determination of men like the late great Senator Hiram W. Johnson and former Congressman Phil Swing whose persistence brought enactment of the Boulder Canyon Project Act, and like the late great State Engineer Ed Hyatt and others with unlimited imagination who conceived our great Central Valley project.

Yet, the needs of our State are far from satisfied. That is why legislation now is pending in Congress for joint Federal-State construction of the San Luis unit of CVP. That is why in recent years we have enacted measures authorizing such works as the Trinity unit, the Ventura project, and the Solano project, which I personally was privileged either to sponsor or actively support. That is why my present colleague Senator Clair Engle and I are seeking authorization of Auburn Dam.

Several of the many facets of the Nation's water problem which occupy the attention of this committee were touched on in a statement of basic tenets which my previous colleague, former Senator William F. Knowland, and I issued more than a year and a half ago. In that document, dated January 16, 1958, we asserted the acute problem confronting California "is as challenging in our day as the rugged mountains and arid deserts conquered by California's pioneers."

We noted the major factors contributing to the complexity of the problem of water, geographic maldistribution and the time of its availability. We emphasize the urgency of Federal and State cooperation and appealed for subordination of sectional and partisan differences among Californians. These needs have not diminished in the interim, as I am sure this hearing and that tomorrow in Los Angeles will make it plain.

The questions before us today have considerable immediate significance. However, the true importance of this committee's assignment lies in finding ways to care for our children and our children's children. If this committee can help establish guidelines for tomorrow,

insure more effective coordination, eliminate frictions, and point the way to composing differences between States and between the State and Federal Governments, the effort involved will have been well worthwhile.

Now I am very glad to ask a distinguished U.S. Senator whom I have the honor to call my colleague from California, whose long experience in this field admirably equips him to participate in this committee, to speak.

Senator Engle.

STATEMENT OF HON. CLAIR ENGLE, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator ENGLE. Thank you very much, Senator Kuchel.

I desire to express my very great appreciation to the chairman of the Select Committee on Water Resources, Senator Kerr of Oklahoma, and our colleague from North Dakota, Senator Young, for bringing this committee here. I think the fact that we have 2 days of hearings in California indicates not only the imoprtance of water in California but the impotrance of California in the whole water picture. California has proposed some dramatic steps as a State in the field of water development. The things occurring here are going to be watched throughout the Nation. Perhaps the relationship which our State establishes not only with its own local agencies but with the Federal Government will have a significant bearing on attitudes taken throughout the United States and in other parts of our country.

I would like to say to my friend from Oklahoma that we are glad to have so many Oklahomans in the State of California.

I recall that Governor Warren had a standing bet with the Governor of Iowa that there were more Iowans in the State of California than there were in the State of Iowa. As far as I am aware, the Governor of Iowa never accepted that bet and it was never resolved. But Governor Warren did make the assertion and it was never successfully challenged.

We don't say, Senator Kerr, that we have more Oklahomans here in California than there are in Oklahoma, but we are glad to have the Oklahomans here, just as we are glad to have the Texans here. I recall one time I was talking to one of my Texas friends and I commented on the fact that the Texans were fine citizens and we were glad indeed to have them in California. My Texan friend, who didn't apparently like the departure of the citizens of Texas from the State of Texas, any more than you like the departure of the citizens of Oklahoma from Oklahoma, made this statement. He said, "Any Texan who would leave Texas to go to California raises the intelligence standards of both States."

Well, I had to think a while before it occurred to me just what that fellow had done to me with that remark. I am not going to go that far today. I am not going to say that the Oklahomans who have come to California have raised the intelligence standards of both States but they are good citizens and we are glad to have them here and we are especially grateful to you, as chairman of this committee, for bringing it here to hear what California witnesses have to say with regard to their own water needs, their own water plans and what they regard

as the program that ought to be adopted, not only statewise but Federalwise for the next 20 or 25 years.

I am not, Mr. Chairman, going to make any long statement this morning. At some subsequent time I do intend to have something to say on this subject. I would prefer, though, at this time to yield to the great number of wintnesses who are here. Our time is brief. I understand that it is the desire of the committee to get out early and go to Los Angeles. I know that the Governor of our State and this long list of witnesses before us will contribute substantially to the information of the committee and toward the end we are trying to accomplish by the work of this committee.

Senator KUCHEL. Thank you, Senator Engle.

Governor Brown will return during the day, perhaps later in the morning and we will interrupt the witness then testifying in order to accommodate him. Meanwhile, unless there is objection I would first like Mr. Harvey Banks, the director of the division of water resources to come forward.

The CHAIRMAN. Proceed, Mr. Banks.

STATEMENT OF HARVEY O. BANKS, DIRECTOR OF WATER RESOURCES, STATE OF CALIFORNIA

Mr. BANK. Thank you, Senator Kuchel, Senator Kerr, Senator Young.

My name is Harvey O. Banks. I am director of the State department of water resources. I am very deeply appreciative of the opportunity of appearing here today before your committee.

I have prepared a rather lengthy statement which I would like to submit to the committee for your consideration, but in the interest of saving time here today, because you do have a large number of witnesses to apear, if it meets your approval I would like to abstract the pertinent points from that and not go into the detail of that statement.

The CHAIRMAN. The entire statement will be received and will be set forth in full in the record. However, you may proceed, and thank you very much for your suggestion.

Mr. BANKS. In my presentation today I shall emphasize the vitally important matter of Federal-State cooperation in the development of California's water resources, since only through close cooperative effort between the two levels of government can we hope to solve our problems.

We are forwarding to your committee a comprehensive statement and extensive data concerning California's anticipated population growth and its water resources, requirements, problems, and plans; that statement also presents our views on many of the subjects outlined in the announcement for this hearing. Therefore I shall not repeat them here.

For some 75 years, the State of California has been developing this information; expending millions of dollars in studying its water resources, collecting basic data, making surveys and investigations, and planning. In essence, our findings show that California has ample water resources to meet its needs, and that its real water problem lies in the financing, construction, and operation of physical works, and to control, conserve, and distribute those resources to meet our expanding water needs.

Any of you who have traveled this State from one end to the other can appreciate the magnitude of our problems. Nature has been kind to California in many ways, but she was improvident in distributing our most valuable resource, water. It is not overdramatizing the situation to say that the very future of this State deepnds upon our success in altering nature's scheme of things.

The mean annual natural runoff of California streams is estimated at 71 million acre-feet. During the period of record since 1894 this has varied from a minimum of 18,300,000 acre-feet in 1923–24 to a maximum of 135 million acre-feet in 1937–38. About 70 percent of these resources occur in the northern one-third of the State, north of the latitude of Sacramento, while about 75 percent of the water demand, both present and future, will be in the southern two-thirds.

We expect our present population of between 15 and 16 million to grow to 28 million by 1980 and to 56 million by 2020, with about 50 percent of the total residing in southern California. This population growth, and the accompanying economic expansion, will cause our water requirements, that is, consumptive use plus irrecoverable losses, to increase from the present amount of approximately 24 million acre-feet per year to about 55 million acre-feet per year.

The CHAIRMAN. May I ask a question there?

Mr. BANKS. Yes, sir.

The CHAIRMAN. Is that expectation based on the population growth you have in mind that will occur before 1980 or before 2020?

Mr. BANKS. That is 2020.

The CHAIRMAN. I see. That is all I wanted.

Mr. BANKS. The anticipated growth in economic demand for supplemental water in the State's service area in the San Joaquin Valley, the coastal counties of San Luis Obispo and Santa Barbara, the desert areas, and in southern California, plus that in the proposed Federal San Luis service area through 2020 is shown on the attached chart. Also shown is the staging of major projects to satisfy the demand. The chart to which I refer is on the easel behind me here. The S-shaped surface rising from the lower left toward the upper right shows the anticipated increase in water demand, supplemental water demand and the vertical line shows the staging of projects and the yield thereof to satisfy that demand.

If the committee desires I would be glad to explain in further detail?

The CHAIRMAN. Is a copy of that chart attached to the statement?

Mr. BANKS. Yes, it is.

The CHAIRMAN. Fine.

Mr. BANKS. Our comprehensive, long-range planning has shown conclusively that it is physically and engineeringly feasible to control, conserve, and redistribute the State's water resources so as to meet the water demand under conditions of full development and utilization of our land resources, when and as needed and justified. However, the cost will be high—between $12 and $15 billion at today's price levels.

Obviously, a job of this size can only be accomplished through the combined efforts of Federal, State and local interests. Problems of proper governmental interrelationships are therefore inherent in California water development. These problems assume critical proportions, moreover, when it is recognized that the State can no longer

confine its activities to planning and investigation, but must take its place as a leading and guiding partner in project financing, construction and operation, supplementing, and complementing the efforts of others.

To illustrate, allow me to cite some facts and figures. The State of California is now actively engaged in a water development construction program encompassing projects, large and small, throughout the State, that calls for expenditures of $2 billion or more over the next 25 years, as shown on the attached map. And that map, I think, also, copies have been passed out to you, which show the facilities considered for the next 25 years. Some $125 million has already been spent or appropriated to get this work underway. However, this is the largest, most comprehensive water development venture ever attempted in California or perhaps anywhere else. However, this program, large though it is, will not meet California's needs for additional water suplies. It is designed to supplement, not supplant, the programs of Federal agencies and local interests, which must continue.

The State's program must be fully coordinated with the construction programs which have been carried on for many years by agencies of the Federal Government, most particularly, the Corps of Engineers and the Bureau of Reclamation. These are the programs which, along with local efforts, have filled the breach so far, and which the State program is designed to supplement and complement. Their approximate dollar values are as follows:

Expenditures to date:	
Corps of Engineers	$600,000,000
Bureau of Reclamation	850,000,000
Total	1,450,000,000
Projects under construction but not completed (total estimated cost):	
Corps of Engineers	$608,000,000
Bureau of Reclamation	[1] 385,000,000
Total	993,000,000
Projects authorized but not under construction:	
Corps of Engineers	$90,000,000
Bureau of Reclamation	Nominal
Projects in the investigational and/or planning stage:	
Corps of Engineers	$300,000,000
Bureau of Reclamation	1,400,000,000
Total	1,700,000,000

[1] Including program loans.

The programs of the U.S. Department of Agriculture are becoming of increasing significance and must be fully coordinated with the others.

It is evident that programs of this magnitude could raise intergovernmental conflicts when they operate side by side. The State's projects, in many instances, will be built upon the same stream systems and divert from the same sources as Federal flood control and conservation works. The State's service area will adjoin that of the Federal Central Valley project in the San Joaquin Valley. Problems of water rights, coordination of operation of physical works, joint use of facilities, and the like, are inevitable.

If the State and Federal programs are to truly complement each other and achieve their vitally important goals effectively and eco-

nomically, these conflicts must be anticipated and avoided to the maximum extent possible. Close cooperation and coordination is absolutely essential; without it only waste and confusion can result.

While the course of Federal-State cooperation in water development at times has been uneven, there is nevertheless ample precedent for future adjustment and agreement. I would like to discuss a few of the many instances where harmonious cooperative effort is now being achieved here in California with great benefit to all concerned.

The most recent of these is the State of California's acceptance of responsibility for underwriting repayment of the conservation benefits of the Federal Black Butte and New Hogan projects. This new approach to repayment for Federal projects will expedite construction of needed facilities in those instances where local interests are unable to execute repayment contracts in advance of construction as required by Congress. Along the same lines of cooperative financing, and of great importance to California's water program, are flood control contributions by the United States for State and local projects as has already been authorized for Oroville Dam, a key unit in the State's Feather River and Delta diversion projects.

The department of water resources is now working with the U.S. Forest Service to effect a cooperative arrangement for the administration and operation by the service of recreational facilities on Federal lands adjoining State water projects.

A field of longstanding in Federal-State cooperative endeavor is that of data collection, investigation, and research. In pursuing its extensive studies of the State's water resources and development thereof, the State of California has, in common with other States, worked closely with and contributed significantly to the financial support of the several Federal agencies engaged in the same activities. The new fields of saline water conversion and weather modification offer prime examples of cooperative effort. The State of California has appropriated $1,600,000 for expenditure by the department of water resources in cooperation with the United States in the financing, construction, and operation of the Federal demonstration sea water conversion plant with the accompanying nuclear reactor, to be located at Point Loma in San Diego County. A similar joint undertaking is the "Santa Barbara project" where State and Federal agencies are participating in a large-scale experiment to evaluate the effectiveness of weather modification in increasing the available water resources.

The CHAIRMAN. May I interrupt there?

Mr. BANKS. Yes, sir.

The CHAIRMAN. Is that all you say in the statement about that particular effort?

Mr. BANKS. That is all I have said in this statement, Senator.

The CHAIRMAN. I mean further on in the statement do you have more remarks about how that project is getting along and what progress is being made?

Mr. BANKS. Senator, we are sending that to you in our comprehensive statement. Yes, we will furnish you that. I do not have it in this particular statement.

The CHAIRMAN. But you will furnish that information?

Mr. BANKS. We will furnish the information.

The CHAIRMAN. Does that statement give any evaluation of the progress made in terms of what the cost must necessarily be on the

basis of present operation and what the hope is as to what the cost will be in the future?

Mr. BANKS. The Santa Barbara project is not so much concerned with the economics of the thing but in experimental evaluation of whether or not there is in fact a significant increase in rainfall in the accompanying water supply.

The CHAIRMAN. I thought you were referring here to desalination.

Mr. BANKS. Yes, I am, sir. That also. I misunderstood you.

Yes, we have some information and that will be furnished in our comprehensive statement. I did not go——

The CHAIRMAN. Does your statement give any indication of the economics of your great projects to take water from northern California, central California and southern California?

Mr. BANKS. Yes. That is being furnished you as part of our comprehensive statement.

The CHAIRMAN. I would appreciate it if you would give to the staff an extra copy or two of that statement. I would like to have access to it even before the matter would be available to me from the printed record that will be made from the notes of the reporter.

Mr. BANKS. Yes, we will be glad to do that.

The CHAIRMAN. Could you tell me now, taking into account the amortized cost and carrying charges and so forth, plus the construction of the project, what you expect the cost to be of delivering water to southern California?

Mr. BANKS. The equivalent annual cost of delivering water into southern California and by this let me be explicit as to what I include in that term in southern California—I include the counties of Ventura, Orange and the coastal portion of Los Angeles, San Bernardino, Riverside, and San Diego.

Water can be taken from northern California and delivered into that area for an average annual cost over the payout period of about $48 per acre-foot.

The CHAIRMAN. What does that reduce it down to in terms of cost per thousand gallons?

Mr. BANKS. That would be 16 cents.

The CHAIRMAN. Sixteen cents. How would that compare with the cost of water now being brought in the same area from present sources of supply?

Mr. BANKS. That is considerably greater, Senator, than the water that has been developed locally from the groundwater and from local streams, but it is perhaps 25 percent greater than the present cost of the Colorado River supply delivered into southern California.

The CHAIRMAN. Where is that water coming from?

Mr. BANKS. From the Colorado River, sir.

The CHAIRMAN. From what projects does it come? I am not interested at this time in the contest. I am trying to get into my own mind the distance it is being carried and the cost of the water delivered.

Mr. BANKS. Well, for comparative purposes, of course one would have to adjust the cost of the Colorado River supply to current day price levels. The metropolitan——

The CHAIRMAN. I understand that. But actually, of course, the supply they get there is limited.

Mr. BANKS. That is right.

The CHAIRMAN. But on the basis of the amount being received, do you know what it cost to deliver, say, to Los Angeles?

Mr. BANKS. I say counting the taxes paid to amortize the capital investment the present cost is about $40 per acre-foot.

The CHAIRMAN. That is water coming in from——

Mr. BANKS. The Colorado River.

The CHAIRMAN. The Colorado River?

Mr. BANKS. Yes, sir.

The CHAIRMAN. $40 per acre-foot and this other you said $48?

Mr. BANKS. Yes, sir.

The CHAIRMAN. Now, in your own judgment, how do those prices compare with the target figure that you have in mind for water secured through the desalination of the ocean water?

Mr. BANKS. My own analysis of the situation, Senator, with respect to saline water conversion is that there is small chance of reducing the cost of converting saline water to that figure for many, many years in the future. I see little prospect of it.

The CHAIRMAN. I see.

Mr. BANKS. I might also point out, Senator, that this figure I have given you of $48 per acre-foot is for delivery at elevation 1,000 and above, whereas, of course, in the sea water conversion it would be at——

The CHAIRMAN. Sea level?

Mr. BANKS (continuing). Sea level and must be boosted to points of delivery inland.

The CHAIRMAN. What would be the extent of the lift involved in the project for northern or central California and southern California? Is that information all in the statement that I have?

Mr. BANKS. It is not in this statement. It is information which your committee either has now or will have in the very near future. It is not in this.

For your information, though, of course the principal point of diversion is from the delta at sea level, surplus waters at that point plus regulated releases from upstream areas. Then it is boosted to a maximum elevation in crossing the Tehachapis a little better than 3,200 feet and then power is recovered at the other side at about 1,600 lift in feet. The net boost is roughly 1,700 feet static lift.

The CHAIRMAN. I see. Well, thank you very much.

I want to say to you that I know of nothing that I have heard in the study of the Nation's water resource development that has challenged my thinking more than the daring and boldness and specifications of the project that you have in mind out here, and frankly, the principal reason that I came to spend even the brief time that I can was to get as much knowledge as I could about that project.

Mr. BANKS. Thank you very much, Senator, and we shall be very pleased to forward to you the complete story on the thing with all of the data and information. If you wish, we will forward additional copies direct to you for your perusal on the thing.

The CHAIRMAN. Fine. Thank you very much.

Mr. BANKS. I have not tried to include all of this in this statement.

The CHAIRMAN. I see.

Mr. BANKS. A common endeavor of the State of California and the United States, of which your committee already has some knowledge,

is the proposal for joint Federal-State financing, construction, and operation of certain major facilities to be built in Merced and Fresno Counties. These comprise the San Luis Dam and Reservoir, which are necessary to provide offstream storage for additional surplus water to be conserved from the Sacramento-San Joaquin Delta, and the San Luis Canal and appurtenant facilities including a forebay, afterbay, and pumping plant. These works are necessary both for the State's Feather River and delta diversion projects and for service to the proposed extension of the Federal Central Valley project to include approximately 500,000 acres of valuable irrigable land mostly in western Fresno County. It is proposed, therefore, that these works be built to capacities adequate to serve the purposes of both the State and the Bureau of Reclamation, and that they be financed jointly on a proportionate basis by the State and the United States. Actual construction would be done by the Bureau of Reclamation. It is further proposed that the joint works be operated by the State with the operating expenses borne on a proportionate basis.

The State and the Department of the Interior have long since reached agreement on proper language for the Federal authorizing legislation.

The State has the necessary authority to enter into such a joint venture agreement with the United States. The State legislature has appropriated funds to purchase the necessary lands involved which, upon consummation of agreement with the United States, would be turned over to the United States as a part of the State's financial contribution.

Senator KUCHEL. Has any of the property been acquired?

Mr. BANKS. It is under condemnation.

The CHAIRMAN. At the moment?

Mr. BANKS. Yes.

The CHAIRMAN. Suits have been filed?

Mr. BANKS. Yes. The State is also doing certain exploratory, investigational, and design work at the present time; again with the expectation that this work will be made available to the United States if the joint venture arrangement goes through.

I might add that the reason we are doing this is in order to minimize the delay in getting the project underway.

It is noteworthy that such a joint arrangement would result in material monetary savings both to the United States and to the State as compared to the cost involved were each to build its own separate facilities. The respective service areas do not in any way overlap, and there will be no Federal funds expended for the benefit of those water users within the State service area. In fact, the joint effort would result in savings to the water users supplied by the Bureau of Reclamation.

The type of cooperation that we have envisioned for San Luis is unique and, as has been stated, would result in substantial savings to both the United States and the State. It would establish a very worthwhile precedent for further water development. However, until the present impasse over the demand by some Members of Congress for the imposition of Federal law on State projects is resolved with fairness and equity, it appears that San Luis may be further delayed with consequent loss to the Nation.

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I would like to say further that these demands in Congress appear to have been based upon a misunderstanding of the proposal and of the physical and financial facts involved.

As noted above, State facilities will in many instances be located on the same streams as Federal projects, and State aqueducts will divert from the same sources as Federal canals. A high degree of coordination in the operation of these several works will be imperative if we are to achieve optimum flood control and water conservation, at the same time respecting the respective water rights and maintaining the financial integrity of the several projects. This matter must be given detailed cooperative study by the Bureau of Reclamation, the Corps of Engineers, and the State department of water resources. Certain joint preliminary studies are already in progress. It is anticipated that it may be necessary to set up a joint operation center.

This should give some idea of the scope of Federal-State cooperation in water development in California to date. Much has been accomplished through the coordinated pooling of effort and finances. But, we are now entering an era of greatly expanded programs, at the Federal, State, and local levels of government, under conditions of rapidly increasing demands, increasingly scarce resources, and high costs. This calls for an even higher degree of cooperative effort.

Cooperation and coordination are rather general terms. What exactly do we now need from the Congress to achieve the goal of fully effective Federal-State cooperation under today's conditions and those of the future? First of all, we need a measure of guidance.

There should be a clear definition by Congress of the degree of national interest in the development of water resources and of the extent to which we can expect the United States to actively participate in such developments. We are pleased to note that this is one of the principal objectives of the Senate Select Committee on National Water Resources. This definition should recognize that there must be increasing State participation in all phases of water development. The States are beginning to pick up their share of the responsibility for the financing, construction, and management of water programs, as well as for their planning. As we enter this field, we must know what we can expect from the Federal programs so that our activities can be coordinated therewith.

The authority and responsibilities of each of the Federal agencies should be clearly delineated with a view to better coordination of functions, both as among themselves and with State and local agencies.

Several bills have been introduced in Congress which undertake to enunciate a national water resources policy. It does not appear, however, that any single one of these is of sufficient scope to attain the desired goals. In this regard, any proposal for river-basin or regional commissions to coordinate water resource development activities must provide for adequate voting representation by the State or States involved. Most such proposals that have been advanced to date would relegate the State or States to a minority position.

Another policy matter which is in vital need of clarification as the States become actively engaged in water development is the extent to which the United States will assume responsibility for flood control; specifically the question of whether the Federal Government will

assume the costs of State and local multipurpose projects properly allocated to this function. As noted previously, an affirmative position has been taken by the Congress with respect to Oreville Dam and certain other projects. It is recommended that this policy be made general in application.

We must also know to what extent we can reasonably expect the Federal Government to provide low-cost water for irrigation purposes. The Small Reclamation Projects Act of 1956 now authorizes interest-free loans to non-Federal projects where irrigation is the primary purpose to be served. There are bills now pending in Congress which would make loans available to States and local agencies to cover the costs allocated to irrigation, where the irrigation purpose is secondary to municipal and industrial supply. We believe that this legislation is very desirable, since there is an increasing trend toward this type of project. Certainly there is a high degree of national interest in the provision of an adequate water supply for agricultural purposes.

A fourth problem area which has received considerable attention in recent years, but so far without clarification, is that of State water law as related to water rights. As you are well aware, there is a substantial body of opinion not only in the West but throughout the United States, that recent decisions of the U.S. Supreme Court and administrative interpretations thereof have created a cloud upon rights that have vested under State law, and have rendered uncertain the respective authorities and roles of the State and Federal Government in the administration of water rights and in water resources development. The matter has been extensively discussed before committees of the Congress so it needs no further elaboration here. We recommend that corrective legislation such as H.R. 4567 be enacted by the Congress at the next session.

The CHAIRMAN. I would like to interrupt right there to say that wherever we go, we find evidence of some measure of dissatisfaction with the Supreme Court by reason of its decision with reference to certain matters of great interest to the respective States. However, there has not been general unanimity in the areas where various interests are finding fault.

Mr. BANKS. I realize that quite well, sir.

Senator ENGLE. May I ask a question? Which bill is that? Is that the Barrett bill or a bill similar to the Barrett bill?

Mr. BANKS. No, Senator: the one to which I referred specifically is the so-called substitute bill prepared by Interior in collaboration with Justice.

Senator ENGLE. Who introduced it, if you know?

Mr. WHITMORE. Senator O'Mahoney, sir. The Senate version was introduced by O'Mahoney.

Senator ENGLE. That is what I thought.

Mr. BANKS. There are a number of bills pending. This particular bill only attacks the problem created by the *Pelton* decision.

Senator ENGLE. Is it the same as the O'Mahoney bill?

Mr. BANKS. Quite similar, as I recall it; yes.

Senator ENGLE. To clarify the record, I understand the House bill was introduced by Congressman Aspinall, the present chairman of the Interior Committee.

Mr. BANKS. I believe that is correct, although I must admit I had forgotten the author of the particular bill.

Finally, we believe that all the many Federal agencies active in various aspects of water resource developments should operate under uniformly applicable policies, standards, and criteria, to the maximum extent possible. The present diversity of policies, standards, and criteria under which the several agencies operate, leads, through no fault of their own, to overlap and duplication of effort with attendant waste of money and water, and frequently makes it impossible to achieve proper coordinated action. There are known instances of conflicts among Federal agencies for the same water resources for their respective programs.

Obviously, it is impossible to cover the whole gamut of water policy in a short statement of this nature. We have touched on certain broad policy areas above. In addition, we have certain more specific Federal policy recommendations to submit, notably:

(1) Planning for and execution of water resource development should be on a comprehensive, basinwide, even regionwide, basis, with due consideration and evaluation of all the competing demands for water and for reservoir storage capacity, with the objective of achieving proper balance and optimum benefit. Too much Federal water development in the past has been on a project-by-project, or problem-by-problem basis. This can no longer be tolerated because of the scarcity and cost of development of the resource, and of the necessity for interbasin and interregional transfers of water.

(2) More attention should be given to the proper economic allocation of water for optimum benefit among competing areas and potential uses, particularly where the resources are not adeqaute to meet the total potential demand. Irrigation, for instance, might not be the best use for which a particular water supply should be developed; other uses might yield greater economic benefit.

(3) The smaller upstream projects should be studied concurrently with the major power, flood control, and water conservation projects on the lower reaches of streams. To the extent found feasible, such upstream projects should be authorized and built concurrently with the major projects and should be integrated financially therewith. The financial benefits of downstream power generation facilities should be extended upstream as well as downstream, where and when economically justified upstream projects need to be built.

(4) Recreation and enhancement of fish and wildlife resources should be considered as important project functions, not merely as incidental to the primary functions. The recreational potential of Federal water development projects should be developed to the maximum feasible extent, as the State of California is now doing in its water development program. Likewise, provision should be made for the enhancement of fish and wildlife resources to the extent possible. These aspects should not be left for consideration after the works are built, but should be taken fully into account starting with the planning phase. Costs allocated to recreation and to enhancement of fish and wildlife resource should be considered as nonreimbursable insofar as the water and power users are concerned.

(5) Those Federal agencies, such as the Forest Service, managing public lands around reservoirs should be provided sufficient funds to develop and operate adequate recreational facilities on the Federal lands, whether the reservoirs be federally, State, or locally owned.

(6) Federal programs for the measurement, collection, and publication of basic data should be expanded. These are the facts upon which water resource development must rest and because of the changing influences of man's activities, the need for up-to-date facts is ever urgent. Without basic data, we would be forced to build upon unsure foundations.

(7) More attention should be given to watershed management as related to water yield. Current experimental work being carried on by the U.S. Forest Service, in financial cooperation with the California Department of Water Resources, indicates that proper timber cutting practices in the high sierras might increase the water yield from the snowpack and might so control the rate of melt as to minimize flooding hazards in the lower stream reaches.

(8) Wherever possible, interstate compacts should be consummated before further Federal development proceeds on interstate streams. The difficulties of negotiating interstate compacts increase almost exponentially as the remaining water resources available for further development diminish, as we are finding out in the case of Lake Tahoe, and the Truckee-Carson-Walker River systems where Federal projects, existing, authorized, and planned, would preempt most of the available resources for the benefit of the State of Nevada with little consideration having been given to California's requirements.

Turning now to specifics insofar as California's problems are concerned, we believe that the Federal Central Valley project should accept its proper share of the responsibility of providing salinity control in the Sacramento-San Joaquin Delta in accordance with accepted criteria and with equitable provisions for reimbursement. Salinity control has always been considered as one of the principal purposes for which the project was originally authorized. Without salinity control there is severe damage during dry seasons to the valuable agricultural production of the delta lands as well as impairment of the water supply for the industrial complex in the Antioch-Pittsburg area. This is imperative because of the scarcity and cost of development of the resource and of the necessity for interbasin——

Senator KUCHEL. May I interrupt you at that point a moment, Mr. Banks?

If legislation were to be considered along the lines of providing for salinity control as one of the purposes of the Central Valley project, do I understand then that it would be the position of the State administration to recommend that type of legislation, if it were necessary to clarify it?

Mr. BANKS. Yes, I believe we would.

Senator ENGLE. May I ask one further question?

Isn't it true that in the basic authorizing documents of the Central Valley project salinity control was named as one of its purposes?

Mr. BANKS. I believe you are correct in that, Senator Engle, although an exhaustive study of the various documents pertaining to the Central Valley project and the legislation in connection therewith indicates that it is uncertain whether the provision of salinity control is merely authorized or made a mandatory function.

Senator ENGLE. Thank you very much.

The CHAIRMAN. In other words, it would be inoperative without additional implementing legislation, in your judgment?

Mr. BANKS. Senator, I think additional legislation might help to clarify what is presently a rather uncertain situation.

Senator ENGLE. What you say, if I understand correctly, is that the Federal Government cannot now, if it wants to, although it is authorized to do it?

Mr. BANKS. Yes, sir.

Senator ENGLE. The question is whether or not it wants to do it. As I gather from your testimony, the position of the State is that the Federal Government should do it and if it will not do it voluntarily, then we ought to legislate it into a mandatory status rather than a discretionary one.

Mr. BANKS. Yes. Drainage is now a severe problem in the San Joaquin Valley with no economic way to dispose of the highly saline drainage waters. In order to provide for the disposal of the drainage from its service areas in the westerly and southerly portions of the valley, the State plans to build a master drain extending northward to saline water in Suisun Bay. Under a possible joint venture between the Bureau of Reclamation and the State, sufficient additional capacity could be built into this master drain to provide for the disposal of drainage from the Federal Central Valley project service area. This should be given serious consideration.

We regret to state that we are unable to give you any information as to what levels of cost and expenditures are justified for future water development nor with respect to how much expenditure of public and private funds can be economically justified for water programs. Since water is essential to most, if not all, human activities, it is our considered opinion we have not yet approached such economic limits, if limits do in fact exist.

In conclusion, may I again reiterate that only through close cooperative effort and coordinated action at all levels of Government, Federal, State, and local, can we hope to meet the challenge of providing adequate water supplies for the Nation's rapidly expanding population and economy. Water policies should be formulated with that objective in mind. We hope that the recommendations we have made with respect to Federal water policy will be of assistance to you in your appraisal of national problems.

Thank you very much.

Senator KUCHEL. Thank you very much, Mr. Banks.

Any questions, gentlemen?

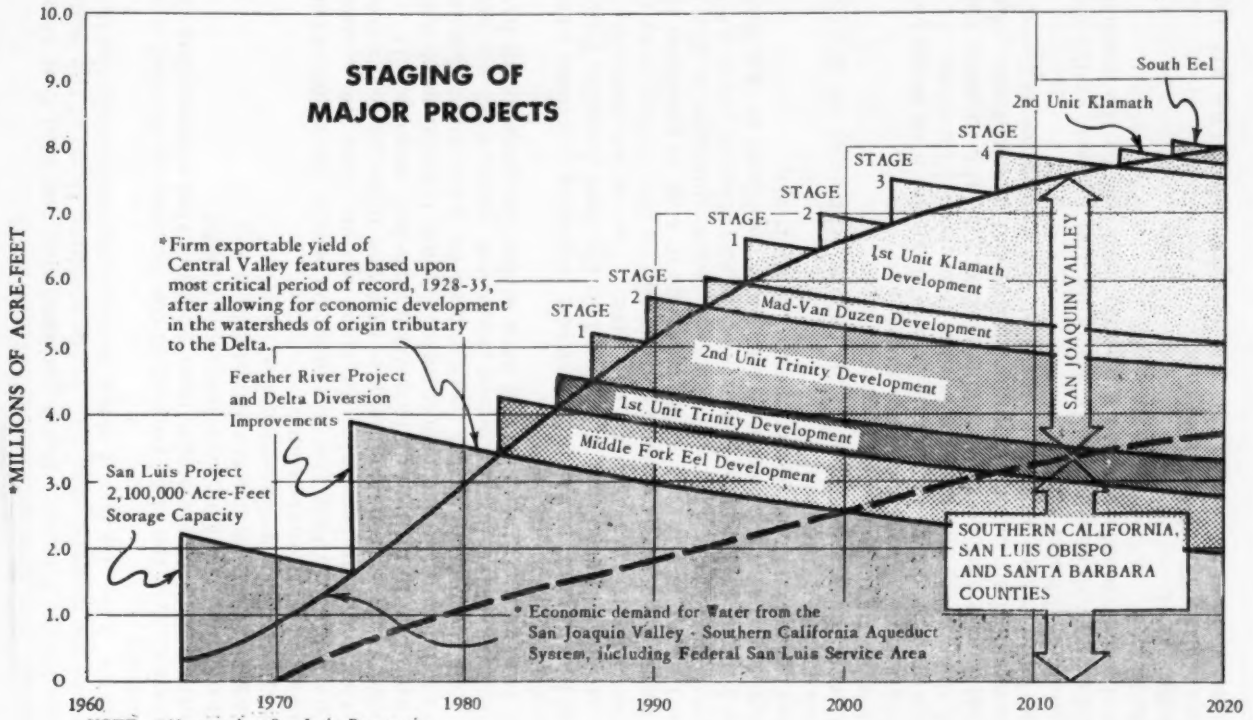
The CHAIRMAN. Mr. Banks, I want to think you for a very fine statement and a very fine contribution to the sum total of my knowledge.

What is the objective that you have in mind in terms of quantity of water to be delivered to southern California? What volume, in speaking of these projects, do you contemplate handling?

Mr. BANKS. As shown on this chart, Senator, by 2020 in southern California plus San Luis Obispo and San Bernardino Counties there will have to be imported an additional 4 million acre-feet. That is shown by the lower dashed line on the chart extending from the lower left toward the right.

The CHAIRMAN. You say that increases the present amount of water required from 24 million acre-feet to 55 million acre-feet?

(The chart p. 704a referred to follows:)



NOTE: *Measured at San Luis Reservoir

NOTE: Timing of North Coastal units possibly may be deferred by interim availability of unused yield of future projects in Sacramento and San Joaquin Valleys.

Mr. BANKS. That is on a statewide basis, sir.

The CHAIRMAN. I know. But I gathered that you said that about 75 percent of the demand would be in the southern third of the State.

Mr. BANKS. Yes. By that I mean south of approximately the latitude of this city.

The CHAIRMAN. Even if 50 percent of the increase in demand were in the southern half of the State, then wouldn't that contemplate the movement of some 16 million acre-feet southwards?

Mr. BANKS. Yes, from this northern area.

The CHAIRMAN. From the source?

Mr. BANKS. Yes, from the source.

The CHAIRMAN. So that the consumption would start somewhere south of the source and actually the total amount that you contemplate moving, that is from the distance of a few miles up to the total mileage, would be 15 million or 16 million acre-feet, wouldn't it?

Mr. BANKS. From the delta southward. Again I would emphasize, Senator, that the figures that I have quoted on total water demand include that necessary for the entire State, not alone what we have projected here as the State's service area under the projects we have under consideration now.

I would like to point out that these water problems and these water deficient areas are by no means confined to the San Joaquin Valley and southern California and the bay area. To cite an example, in Senator Engle's old congressional district, up in Big Valley, way up in Modoc County is a severe water shortage in that to maintain the agricultural economy. There is a severe water shortage in Sierra Valley in Plumas and Sierra Counties up in elevation of about 4,800. So the significant thing concerning our water problems in this State is that they are not confined to any one area of the State.

The CHAIRMAN. Statewide?

Mr. BANKS. They are statewide in nature. The city of Eureka, for instance, at the present time is——

The CHAIRMAN. Where is Eureka, now?

Mr. BANKS. Eureka is way up in the north coastal area about two-thirds of the way to the Oregon border from San Francisco. It is a city that hopes and needs to industrialize. At the moment they do not have sufficient water to support industrial development. And they must build rather extensive works on the local streams there to provide additional water supply.

The CHAIRMAN. Then generally speaking the project would contemplate the movement of up to 4 million acre-feet to the southern area in the State?

Mr. BANKS. Yes.

The CHAIRMAN. Thank you very much.

Mr. BANKS. That is under the works upon which we are now engaged.

The CHAIRMAN. Now, will the projects upon which you are now engaged bring about a situation whereby the demand for 55 million acre-feet will be satisfied?

Mr. BANKS. No. That will not satisfy all that by any means. This will only satisfy the works upon which we are now engaged.

The CHAIRMAN. Let me ask you this, then. What proportion of total State consumption would be usable simultaneously with the transportation of 4 million acre-feet to southern California? You now

have 24 million acre-feet per year. Requirements by 2020 you anticipate 55 million acre-feet. Sometime between now and then you would anticipate the movement of 4 million acre-feet from southern California.

Mr. BANKS. I never thought of it in those terms, Senator. So I would have to make a rough estimate.

The CHAIRMAN. Yes.

Mr. BANKS. I would estimate at this particular time that the State program upon which we are now embarked might satisfy up to possibly a third of the future increase in water demand.

The CHAIRMAN. I see.

Mr. BANKS. I would like with your permission, Senator, to furnish an exact statement on it.

The CHAIRMAN. I would be very grateful to you if you would, because as I told you a while ago I believe that the entire Nation will have to pattern its thinking on terms similar to that of the State of California, and I want to say to you frankly, that it appears to me that you are further ahead in your thinking than any area that I visited or any program that I have learned anything about. It is of such great interest to me and I think that the understanding of it would be so illuminating to people everywhere that I would hope that you would, to the extent that you can, provide the most complete detailed data.

Mr. BANKS. Yes. I will be very happy, sir, to furnish you with a complete description of the program upon which we are embarked, what its objectives are, what service area it serves, and the statistical data in connection therewith. I would like to make the point, however, that the State water development system which has been authorized by the legislature encompasses not only these major works which are principally outlined upon that map there, but also makes provision for State financial assistance to local projects throughout the State where local districts, communities, that sort of thing, are unable to obtain the financing for needed projects through normal channels without exorbitant—I should not say exorbitant—but without high interest rates, we believe it is in the State's interest to give financial assistance to those in order that local interest may continue to fulfill and carry forward their responsibilities in this total picture.

The CHAIRMAN. To take their share of the cost?

Mr. BANKS. That is right.

The CHAIRMAN. I might say to you in this regard, Mr. Banks, as evidence of my keen interest in this program you have, that I made a suggestion in San Francisco in 1950 that the day would have to come when central California water would be transported to southern California, that there was an abundance of water available for that purpose, and the economics as the demand grew would resolve themselves to a favorable basis.

Mr. BANKS. You had great foresight and vision, Senator.

The CHAIRMAN. It was evident to me by reason of the fact that the demand was growing so greatly on the one hand and supply so abundant of such fine water on the other hand.

Senator YOUNG. Mr. Chairman, I had to be absent for a while to take a telephone call and I missed part of your testimony. I am not clear just where you expect to get this additional water supply, from 24 million to 55 million acre-feet, in the coming years.

The CHAIRMAN. He said in that regard that he told us about 71 million acre-feet is natural runoff of the California streams.

Mr. BANKS. Senator Young, the water surplus areas of the State are largely the Sacramento River watershed, which has some 28 percent of the total water resources of the State and the area up here, these streams that flow down northwestward into the Pacific Ocean that has some 13 percent of our total water resources. So in essence north about this point would accur just about 70 percent of our total water resources of the State. So about 75 percent of not only the present but the future demand lies south of that point. So our problem is to control and conserve the waters here and transport them southward to the areas that need it as well as local deficiencies and local need.

Senator YOUNG. There is no runoff wasted from the area there?

Mr. BANKS. Pardon? Yes. The water resources of this entire area are far in excess of their potential needs within those areas.

Senator YOUNG. Thank you.

Senator ENGLE. This has been an excellent statement, Mr. Banks.

Senator KUCHEL. Mr. Banks, the bond issue which the legislature adopted is scheduled to be voted on at the November election in 1960?

Mr. BANKS. Yes.

Senator KUCHEL. Whether or not there were any additional considerations in the legislation with respect to that issue is not my responsibility to decide. In any event, with or without changes, if the people were to approve a bond issue with respect to the California Feather River plan in November 1960, what is your estimate of when the works (which I assume are provided in that bond issue) would be constructed and when would supplemental water first be made available south of the Tehachapi Mountains?

Mr. BANKS. Of course, under our scheduled program the first water will be delivered into southern California in 1971, which is just about the time that we estimate the Colorado River water supply, under our present rights, will be thoroughly and fully committed and in use.

Senator KUCHEL. In that planning consideration has been taken, been given, I take it, to the possibility, the unhappy possibility, of an adverse decision in the *Arizona-California* lawsuit?

Mr. BANKS. Should that happen and should it impair California's supply from the Colorado, before that time, I suppose we could expedite construction possibly a year or two. Although I would point out that this is a tremendous construction program and were we to try to do it on a crash basis, I suspect that the total cost might be possibly some 25 percent higher than if it were done on a normal construction schedule fitting this into the total construction capability and the total construction requirements for all needs.

Senator KUCHEL. Yes. I am sure you are right. Personally, I am semioptimistic with respect to the outcome of that lawsuit. As some of us were talking the other day on the possibility of desalination, the fact is that the needs of water are paramount, the price tag is secondary.

Mr. BANKS. That is quite correct as far as urban development is concerned.

Senator KUCHEL. You have given us a very excellent statement. Thank you very much.

Mr. BANKS. Thank you very much. It has been a pleasure to be here.

STATEMENT OF DeWITT NELSON, DIRECTOR, CALIFORNIA DEPARTMENT OF NATURAL RESOURCES

Senator KUCHEL. DeWitt Nelson, the director of the division of natural resources.

Mr. Nelson.

Mr. NELSON. Senator Kerr, Senator Kuchel and members of the committee, the Department of Natural Resources, State of California, is composed of seven divisions. These are the divisions of forestry, beaches and parks, soil conservation, small craft harbors, mines, oil and gas, and recreation.

In addition, the director, by statute, is a member of the State water pollution control board and the California Public Outdoor Recreation Plan Study Committee which is conducting a comprehensive study of all aspects of outdoor recreation. The director is chairman of this committee by appointment of the Governor. The director also is a member of the Advisory Council to the President's Committee on the National Outdoor Recreation Resources Review Commission.

From this array of departmental functions you will note that we do not have direct responsibilities for water resources. This functional responsibility rests primarily within the California Department of Water Resources. However, the department of natural resources does have functional responsibility in a number of fields related to the water resources of the State as follows:

Protection of water supply and flood prevention by the division of forestry through the protection of the forests, brush and grass-covered watersheds, and rangelands from fire; administration by the division of soil conservation of the State's area of responsibility for Public Law 566 (83d Cong.), the small watershed and flood prevention program; protection of underground water stratas by enforcement of regulatory measures in oil well drilling by the division of oil and gas; and the development and publication of statewide geological data by the division of mines. In the field of water use we are particularly concerned with recreation development through our division of beaches and parks, and division of smallcraft harbors.

California enjoys a Mediterranean type of climate, and receives most of its precipitation during a few winter months; often in the form of extremely high intensities with a high percentage of our total water supply coming in the form of snow above the 5,000-foot elevation. Conversely to this short winter rain and snowfall season we every year experience long, hot, dry summers ranging from 5 to 7 months in the north and from 8 and 10 months in the south.

With 60 percent of the State's 100 million acres of land area in forest, brush, or grassland type, all of which is important from a watershed point of view and all of which is extremely vulnerable to destruction and denudation by fire during long periods each year, the problems of forest fire protection play an important role in water supply, flood prevention, reservoir siltation, water pollution control, and recreation.

Our most fire-vulnerable watersheds are those situated in southern California where heavy brush cover on steep mountain slopes having very erosive soils and exposed to high intensity storms have developed a history of tragic flood damage after denudation by fire.

I might note at this point that the fire which you read about in this morning's paper in the Locadon area of the Angeles National Forest, the fire in that general area in 1934 on New Year's Day was followed by a high intensity storm in which some 30 people lost their lives.

In the southern California area also is a high dependency on local water. Similar conditions prevail also throughout northern California in varying degrees of severity.

In the field of forest fire prevention and control for the protection of the watersheds I recommend:

1. More basic research in cover-type manipulation and management, i.e.: (*a*) how to successfully convert a brush cover-type to a cover-type of less difficult protection and yet one which will adequately stabilize the soil, or how to economically break up great expanses of explosive cover-types in order to minimize fire losses. The State division of forestry and U.S. Forest Service are cooperating in this research at the present time but on a very inadequate scale; (*b*) augment research in the snowpack area in the field of timber management in order to secure maximum water runoff over a maximum period of time. In this field the State department of water resources and U.S. Forest Service are presently cooperating in field research; (*c*) until the findings of research bear more fruit, additional fire protection funds should be made available to the U.S. Forest Service.

You may ask what the State is doing in this area of land and resource protection management and research.

To the division of forestry the legislature appropriates approximately $24 million annually for forest fire prevention and control, forest practices administration, range improvement, research and capital outlay. In addition the six so-called contract counties appropriate approximately $3 million for watershed protection from fire. The forest industries and ranchers collectively contribute through their own operations a very appreciable sum in manpower, equipment, and fire patrol services. In the field of forest, range, and watershed research the division of forestry is expending approximately a quarter million dollars. Most of this is handled on a contractual and cooperative basis with the Pacific Southwest Forest and Range Experiment Station of the U.S. Forest Service and the University of California.

Through our division of soil conservation the legislature has made available $100,000 annually for grants-in-aid to help soil conservation districts meet soil and water problems, and we also provide two engineering teams to supplement the one U.S. Soil Conservation Service team for conducting the necessary surveys for small watershed and flood prevention projects under the provisions of Public Law 566 (83d Cong.).

Recreation and its relation to water is a problem of primary importance throughout the Nation and particularly in California today. Our population of 15½ million people is growing at the rate of approximately one-half million per year. Nearly 90 percent of the people live in our urban areas, which are expanding at an ever-increas-

ing rate. Our citizens are highly mobile, there being approximately 7½ million motor vehicles registered in the State. At every opportunity a high percentage of them hit for the open road in search of recreation, relaxation, new adventures and change of environment. It is estimated that we now have over 300,000 boats and this number is increasing at a rate of about 15 percent a year. The majority of these boats are mounted on trailers for overland transport to water bodies. It is not uncommon for recreationists to trail their boats from the metropolitan centers of southern California to the Salton Sea in the Colorado Desert or to Shasta Lake, Clear Lake, and Lake Tahoe in northern California. Similar boat transport is the normal practice throughout the State. This involves distances up to nearly 700 miles from the point of origin to point of boat use.

Water, in lakes, reservoirs, streams or along the coast, is one of our greatest recreational assets. Newly formed water bodies resulting from water resource development create new and valuable recreational opportunities for the people. The people have more income available for recreational spending and more leisure time; thus it is essential to develop and utilize all available recreational water resources for the welfare of the population.

There is little opportunity for single purpose uses of our land, water, and other resources. There is an interrelationship and interdependence between them which must be recognized and considered in the development of policy for their use. This principle is particularly true in dealing with such a basic resource as water. I have already briefly reviewed the relationship of watershed protection and management to water supply and flood prevention—this affects both quality and quantity of water.

I now present a few recommendations for your consideration in regard to recreation:

(a) Practically every water development involving dam and reservoir construction creates recreation opportunities. Two important things should be done concurrently during the engineering and land acquisition stages: (1) Complete public recreation planning and (2) purchase of those lands which are essential for public recreation development.

These two elements should be required whether the projects are Federal, State or locally financed. The enhancement of local land values of importance to public recreation must not be permitted when public funds are used for said water development. The State of California has been victimized to the extent of several million dollars because the ability to acquire such lands at the time of reservoir site acquisition was denied the Federal constructing agency by a lack of funds or a shortsighted policy.

You may well ask, what is California doing about these problems?

California is aggressively tackling the entire field of public outdoor recreation. The State has under the division of beaches and parks at this time 153 State beach and park units. (1) For the 5-year period, 1956–61, the legislature has appropriated $110 million for beach, park, and recreational area acquisition, development, and operation. It is reasonable to expect that a strong program will be continued in the future. (2) The State department of water resources has a recrea-

tion planning section for conducting advance planning on all water development proposals under their jurisdiction. This work is coordinated with our division of beaches and parks and the department of fish and game. (3) Through our division of small-craft harbors we are working with local levels of government on small-craft harbor projects and the Corps of Engineers on harbors of refuge. For these projects the State legislature has appropriated $5 million and the people have authorized an additional $10 million bond issue for loans to cities, counties, and districts for harbor development purposes. Legislation has been enacted within the provisions of the Bonner Act, Public Law 85–911, 85th Congress, for the registration and regulation of boats on the waters of the State. (4) Legislation has been enacted recognizing recreation and fish and wildlife needs in all State water development projects. (5) Legislation has been enacted which establishes machinery whereby certain reservoirs heretofore closed to public use now may be made available for specific uses such as boating and fishing. This has resulted in several reservoirs being opened to public use for other than water contact sports such as swimming and water skiing. (6) It must be recognized that local levels of government—cities, counties, and districts including utility districts, and power companies are aggressively active in providing and helping to provide recreation facilities and opportunities within their jurisdictional areas.

With the impact of an exploding population no single level of government can provide the public outdoor recreation needs of all the people. If the problem is to be adequately met it will require coordinated cooperation of all levels of government as well as private enterprise.

California is also tackling this problem. In 1957 the legislature appropriated funds for a comprehensive and overall study of the public outdoor recreation needs and problems. This study consists primarily of (*a*) an analysis of present and future needs; (*b*) an inventory of existing and potential areas, facilities, and opportunities; (*c*) an investigation and analysis of the authority of different segments and levels of government with respect to public outdoor recreational resources and facilities; and (*d*) the nature, location, and size of recreational land and water areas which should be developed and recommendations for accomplishment. This report will be submitted to the Governor and legislature in March 1960.

In closing I want to express our appreciation for the cooperative and cordial working relationships which we enjoy with the Federal agencies which are our counterpart at the national level.

Senator KUCHEL. A very fine statement, Mr. Nelson.

Any questions, gentlemen? Senator Kerr, Senator Young, Senator Engle?

Thank you, sir.

Mr. NELSON. Thank you.

Senator KUCHEL. I am informed that Hon. Stephen P. Teale, chairman of the California State Senate Factfinding Committee dealing with water must leave early and we will be very glad to hear him at this time. Senator?

STATEMENT OF SENATOR STEPHEN P. TEALE, CHAIRMAN, CALIFORNIA SENATE FACTFINDING COMMITTEE ON WATER

Mr. TEALE. Senator Kerr, Senator Kuchel, Senator Young, Senator Engle, I am Stephen P. Teale, chairman of the California Senate Factfinding Committee on Water. I am sure that you will receive adequate technical testimony from the department of water resources and others regarding our needs in the water field, both as to quantities necessary and investment of money planned in the future.

My presentation will be brief and aimed at general policy matters—matters of interest to both the State and Federal Government.

During past years, major water development outside that of a purely local nature and that of the great metropolitan areas has been accomplished by the Federal Government. Now California is about to vote on a bond issue of $1,750 million to embark upon a massive program of water development to furnish supplemental water supplies to certain areas of the State. This fact should not suggest to this committee that California desires or needs no participation further by the Federal Government. The contrary is the case.

If California spends the entire bond issue on development and if the Federal Government continues its annual participation at the present level, California will still be a water deficient area. California is experiencing an explosive population growth which according to all experts can be expected to continue. Within 20 years, our population will exceed 28 million people and we must provide water for the domestic needs of our people, along with water for agriculture to help feed and clothe them. The California Senate Factfinding Committee on Water has devoted the past several years to a study of the many problems which must be solved in the near future. Our studies indicate several things.

(1) The California water development system will not begin to furnish adequate supplemental water supplies to many areas of the State. Areas on the western side of the Sacramento Valley and eastern San Joaquin Valley are apparently logically within the sphere of the future Federal water development and must look to that source.

(2) The California water development system, constructed entirely with interest-bearing money, which by the terms of the act must be completely repaid by the revenues from the system, will produce water priced above the ability of agriculture to repay in some areas.

Senator KUCHEL. May I interrupt you there a minute, Senator?

Mr. TEALE. Yes, Senator Kuchel.

Senator KUCHEL. When you speak of the California water development system, are you describing the subject encompassed in the bond issue for the next election?

Mr. TEALE. Yes, that in its entirety.

Senator KUCHEL. And does the bond issue on the ballot spell out, Senator, what you describe here as the manner in which the construction shall proceed, and so forth?

Mr. TEALE. Yes.

Senator KUCHEL. Thank you.

Mr. TEALE. We can furnish you copies and as a matter of fact, you probably have copies of that act already.

Senator KUCHEL. As a matter of fact, I don't.

Mr. TEALE. I will see that you get them.

Senator KUCHEL. Thank you.

Mr. TEALE. Some of these areas, for instance, in Fresno, Kings, Tulare, and Kern County, must have supplemental water in large quantities to replace present overdraft simply to remain in the present economy. And I would like to interject at this point that during our hearings last year, Fresno County alone, the area in the eastern half of Fresno County, made statements to our committee that they needed now 1½ million acre-feet annually to replace their present overdraft and could take that amount immediately.

Senator YOUNG. May I ask this question?

On this program the people in California are going to vote, is this water mostly for municipal supply or will some of it be for irrigation?

Mr. TEALE. I think that in the opinion of the people that have formulated this plan that it is intended for both agricultural and domestic supplies. But it is becoming apparent to us that it is going to be too high priced for some types of agriculture which are necessary.

The CHAIRMAN. What part of your municipal supplies are used for watering purposes, irrigating lawns?

Mr. TEALE. We have lawns and swimming pools, and people and industry, too. I think our primary use will be people and industry.

Future development of the fine agricultural lands still uncultivated in these areas will depend upon newly developed water supplies priced within their repayment capacity.

Historically, the Federal Government has taken major responsibility for providing water to supply new agricultural areas in the 17 Western States. In view of the fact that these facilities have been provided on an interest-free, multiple-purpose project basis, Federal water is delivered at prices within the ability of agriculture to pay. It is questionable whether the State can develop water for new lands and price it within these repayment capacities.

(3) It is estimated that California will spend over $125 million per year during the next 25 years. The Federal Government has been in recent years spending about $100 million annually. Each year this buys less development due to rising costs. We feel that appropriations should be increased commensurate with rising construction costs to insure a continuing degree of water development necessary to meet the demand as it arises.

(4) It is easily apparent that joint use of facilities is in many instances possible and in some cases (for instance, use of the delta) a necessity. We feel that in some instances joint use would afford an economic benefit to both State and Federal agencies. We feel that immediate consideration should be given by both Federal and State agencies to wholehearted cooperative management of the water resources of the State. And we feel that stored water available for markets yet undeveloped should be made available for immediate interim use through whatever facilities are available for prompt usage, pending actual completion of further conservation projects by both the State and Federal agencies.

In summary, I wish to make the following points:

A. California must have both State and Federal development of water to provide adequate future supplies.

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B. Federally developed water priced according to present-day practices must be made available in continually increasing amounts if agriculture is to survive and grow.

C. Continued Federal participation is necessary and must take into consideration rising costs of construction and increasing need for additional supply.

D. Mechanism for joint Federal and State management of water production and transportation facilities must be developed soon.

I would like to repeat that, that we must make provision for this integration and cooperation.

E. I feel that the California Legislature will work with the Federal Congress to achieve the close coordination which will be necessary to achieve maximum benefit and a minimum of duplication and conflict in the future development of California water. Unless this end is accomplished, our future will be seriously affected by continuing water deficiencies.

I wish to thank the committee for this opportunity to express my views and the views of our committee. I would be happy to answer any questions you may have now or furnish any supplemental information you may desire.

I would like to add that we have a wealth of information and reports that have been furnished to us by local water agencies and local well engineer reports which are available and which we would be glad to furnish to the committee if you would like them.

Senator KUCHEL. A very interesting and thought-provoking statement, Senator.

Gentlemen, are there any questions?

The CHAIRMAN. Yes. In your summary, subparagraph B:

> Federally developed water priced according to present-day practices must be made available in continually increasing amounts if agriculture is to survive and grow.

I want to say first that I am very interested in that statement, premise, and conclusion. How do you reconcile it with your statement that under the economics of the proposed project that you have here the agricultural user could not afford to pay the price?

Mr. TEALE. I think, Senator Kerr, it comes to the study of amounts of water that are going to be necessary and the amounts of water which they presently have available to them. In many of our areas we have utilized the ground water supplies and the present surface water supplies to their maximum and are now adding supplemental water from Federal projects and from local projects, which is more expensive than the original supply available. Then we contemplate adding future supplemental supplies of water.

The CHAIRMAN. Now, if I understand the evidence I have heard thus far, it indicates that the additional quantities you hope and expect to secure and utilize will increase the unit cost rather than decrease it or be such as to decrease the average after the additional supplies are averaged with the existing supplies.

Mr. TEALE. That is right. That is the point I was trying to make. In some areas we still have undeveloped agricultural lands. This is particularly true in the San Joaquin Valley.

The CHAIRMAN. Yes. But how can agriculture, and I am not asking this question to criticize, I am asking it only to secure information,

how can agriculture on the basis of the economics involved hope to participate in it?

Mr. TEALE. Well, they hope that there will be sufficient cheap water to mix with the expensive water to make it possible to continue the development of these areas.

The CHAIRMAN. Is there available additional water supplies that can be developed at a cost either similar to the cost of previous water supply developments, or at less than the overall cost of the anticipated future supplies to agriculture or anybody else?

Mr. TEALE. I don't think any new water will be as cheap as that we already have developed. But I think some new water developed can be cheaper than others depending on the method of finding.

The CHAIRMAN. Do you think you can work out a program whereby the sources of water that are cheap would be earmarked for agriculture and the others marked for municipalities and industries?

Mr. TEALE. My committee held hearings Thursday and Friday of last week and are going to hold some more on this same subject. There is some division in the areas of the State as to whether or not this should be done.

The CHAIRMAN. I noticed, either from your statement or another, that about 9 percent of your population is urban.

Mr. TEALE. That is right. And this is going to be increasingly along those lines as time goes on.

The CHAIRMAN. The equities would have to be pretty strong for a population to bring about legislation for the development of a program earmarking the low-cost water for the 10 percent and reserving the high-cost water for the 90 percent.

Mr. TEALE. That is right. That is one of our problems.

The CHAIRMAN. A most peculiar tendency in the Congress of the United States is that as the percentage of the population of our country in urban areas continues to grow to find anything other than a diminishing interest to providing a program for agriculture which those who make a living out of it regard as equitable.

Mr. TEALE. We have areas in this State, predominantly in the southern and presently metropolitan areas that within 40 years will be practically 100 percent urban.

The CHAIRMAN. Urban?

Mr. TEALE. That is right. But we still have large areas within the Central Valley that will still be predominantly agricultural.

The CHAIRMAN. I must say that I am very much in sympathy with the objectives you set forth in this paragraph B. I would like to have your considered judgment in the development of an answer for the record as to how you would hope to provide that amount.

Mr. TEALE. Could I make a supplementary statement?

The CHAIRMAN. I would be very happy to have it.

Senator KUCHEL. Would the Senator yield?

Is it not true that one of the reasons we are talking in terms of high-cost water is here for the first time we are talking about a State water plan?

Mr. TEALE. That is right.

Senator KUCHEL. Which requires going over some mountains to bring apparently surplus waters from the north to the parched area

in the south and to that extent doing something which Federal reclamation projects thus far have not been required to do?

Mr. TEALE. That is right. We are trying to furnish, I think, water in our State water plans for areas that have not been considered service areas by the Federal Government.

The CHAIRMAN. In so doing, if thought is given to allocation of certain percentages of water to agriculture, I must say that I would be greatly interested because I think your whole program here is going to be a precedent for the country. I think it is going to be studied by the country, because I think the country is going to continue to awaken to the necessity of doing something comparable or similar and the point you referred to here is going to be a question everywhere.

Mr. TEALE. That is right.

The CHAIRMAN. That is the matter of considering allocation of certain parts of the water to agriculture. And if you find the happy solution to it, that is going to be a blessing not only here but everywhere.

Mr. TEALE. Senator, we are looking for a solution.

The CHAIRMAN. I would be glad to be advised of the progress made.

Mr. TEALE. Fine.

Senator YOUNG. May I ask a question?

I note that from either your statement or from that of the previous witness that you expect that further Federal assistance in developing water projects or irrigation for farming purposes will be made. Is it anticipated there will be 100 percent of repayment of the Federal cost?

Mr. TEALE. I don't think that is the anticipation by the general public in California. I think that they are anticipating a continuation of the present policies in which there is agricultural water supplemented to the extent that interest-free money is made available for the agricultural water.

Senator YOUNG. I may say that part of the reason for the increasing opposition to reclamation from other States is the problem of competition. As you know, you can raise cotton, for example, in irrigated land here cheaper than they can in most of the Southern States.

Mr. TEALE. I don't think——

Senator YOUNG. Those States appear to have competition and are showing increasing opposition to reclamation projects because of that.

Mr. TEALE. Senator, I don't think we have to worry too many years. I think within the foreseeable future that our cotton patches will be raising kids.

Senator YOUNG. And other crops?

Mr. TEALE. And other crops; yes.

Senator YOUNG. Thank you.

Senator KUCHEL. In that part of the water plan contemplated to be constructed under the bond issue, Senator, are the projects to be built multiple purpose in character?

Mr. TEALE. That is my understanding of it. That is what we voted for.

Senator KUCHEL. The difference which you suggest, then, is that the cost of water to the farmer as it is historically provided for in Federal reclamation law is approached differently. In this California water plan there is no provision for the sale of water to farmers based

on ability to pay with the revenues from power underwriting that cost?

Mr. TEALE. No, Senator Kuchel; the California water plan does not produce a surplus of power. It only produces about half of the total power supply which we will need to accomplish the pumping. The testimony which we have received has indicated that they feel that the subsidy to agriculture should be a matter for local determination and spread over the local tax base as it is in the metropolitan service areas of southern California. They have a dual pricing of water there. They pay the entire cost but they make it up by taxing the high value tax base in the urban areas that are adjacent to agricultural areas. There are some areas in our Central Valley that do not have the high value urban areas to tax.

Senator KUCHEL. Thank you, sir.

Senator YOUNG. I think there is a distinct advantage to the people in the cities to help provide a lower cost water rate to the farmers. For example, most all of the hogs produced in North Dakota, South Dakota, Nebraska, and Kansas, and even part of Iowa, are shipped to the west coast. That is additional freight rate and additional cost to the people. Your people do benefit directly, I think, by providing a cheaper rate to your farmers for that purpose.

The CHAIRMAN. Now, Senator Young, I hope they solve that problem. Sincerely, I hope they do because the person needs the pattern that will be given them by such solution. I want to say as I contemplate the information given us by Mr. Banks that this State expects to have a population of 28 million in 1980 and 56 million by 2020, I was thinking about what a wonderful market it was going to be for North Dakota and Oklahoma beef and other products, and I want to say that you fine people in California if you don't solve that problem, we are going to do the best we can to solve it for you on the basis that will be mutually advantageous.

Senator KUCHEL. Thank you very much, Senator.

Mr. TEALE. Thank you.

Senator KUCHEL. The next witness is Mr. Stanley Kronick, the president of the State reclamation board. With him is Mr. A. N. Murray, chief engineer of the Board.

STATEMENT OF STANLEY KRONICK, PRESIDENT, STATE RECLAMATION BOARD, ACCOMPANIED BY A. N. MURRAY, CHIEF ENGINEER

Mr. KRONICK. I am Stanley W. Kronick, president of the State reclamation board. I am pleased to appear before the committee to present for your consideration some views on those aspects of national water policy which closely concern the reclamation board.

The reclamation board consists of seven members appointed by the Governor, and employs a staff to carry out the statutory functions assigned by the legislature. The members also serve as a board of directors for the Sacramento and San Joaquin Drainage District. The district encompasses an area of 1,750,000 acres extending from about Chico to approximately Fresno. Roughly, it is most of the valley area shown in gray on the map.

The district covers parts of 14 counties and a major portion of the floor of the Sacramento and San Joaquin Valleys. The board also controls construction or other modifications of flood channels on the Sacramento and San Joaquin Rivers and their tributaries to the end that the ability of those channels to pass floodflows will not be impaired.

Senator ENGLE. Could I ask, Mr. Kronick, when that San Joaquin-Sacramento Drainage District was established?

Mr. KRONICK. It was established roughly about 36 or 37 years ago, I believe.

By statute the reclamation board cooperates with the Corps of Engineers in the construction of levee and channel improvement projects within the drainage areas of the Sacramento and San Joaquin Rivers. This cooperation consists of acquiring the necessary rights-of-way for levee and channel improvements, of holding the United States harmless for damages due to construction or operation of the channel improvements, and of operating and maintaining the completed channel improvement projects in accordance with Federal regulations. The current and immediate past program of the board involves an anual expenditure of approximately $6 million for these purposes.

The reclamation board, representing the State of California, has been cooperating with the Corps of Engineers in flood control matters for over 40 years. It must have been 40 years, Senator Engle. The Sacramento River flood control project has been brought to a stage of near completion through this joint effort of the State and Federal Governments, together with the effort of local interests. Altogether, local interests, the State and Federal Governments have expended more than $150 million on the Sacramento River flood control project, of which the Federal share has been less than one-half. During the past 10 years approximately $34 million have been expended on the Sacramento River, Middle Creek, and San Joaquin River projects, of which more than one-third was contributed by the State government. Thus we have had, and continue to have, a strong joint program, the costs of which have been shared in large measure on a non-Federal basis.

While it is true that the work of the reclamation board deals directly with construction and maintenance of levees and of channel clearing projects, the board, historically, has had a keen interest in all water development matters in northern California. During the early years of water conservation in our State, reservoirs were constructed solely for water conservation or power production purposes. However, in recent years, economy and plain commonsense have required that reservoirs at or near the foothill lines of the Sierra Nevada and coastal regions should be constructed and operated not only for conservation purposes but for flood control purposes as well. The American River flood control project is an outstanding example of this multiple-purpose development. Folsom Reservoir, with a total capacity of 1 million acre-feet is so operated that empty storage space for as much as 400,000 acre-feet may be held during the flood season. The river channel below Folsom Dam, which has been completely leveed in the past 2 or 3 years under the cooperative State-Federal program, was deliberately designed to carry the controlled flood releases from Folsom Reservoir.

This brings me to a most important point which cannot be overemphasized. Multiple-purpose operation of our water projects, including the coordinated design of multiple-purpose reservoirs and downstream channel improvements, is a must. Happily, this philosophy of multiple-purpose development appears to be firmly established in Federal law and in the administration of that law by the various Federal agencies. We urge the continued development of multiple-purpose projects.

California is a rapidly growing State, as I am sure you are aware. In many of our metropolitan areas, we are leveling the tops of mountains to make homesites—a method of improving land use which only a few years ago would have been thought uneconomic. Flood protection is a means of creating living space or of improving land use to meet the needs of our growing population. Various Federal agencies are engaged in different aspects of planning improvements in our State. These agencies have done well in cooperating with our State and local planning agencies to insure that sound flood protection measures are taken into account in the planning process. We endorse this trend and urge that its application be continued and increased in the future.

One problem we have in dealing with Federal flood control agencies is that of being able to accurately anticipate the extent of Federal flood control appropriations from year to year. In theory we don't know what the national administration's proposed program for fiscal year 1960–61 will be until the President's budget is released in mid-January. Nevertheless, the State, as the cooperating agency, must seek appropriations by the legislature for a program, the level of which we can only approximate at the time the State budget is being prepared. We recognize that the Federal appropriation process cannot involve commitments 2 years or more in advance. However, it would be very helpful in our own planning if we could know that, subject to later change by the Federal Government to meet possible changing conditions, a given annual level of work would be undertaken 2 to 5 years into the future. This may be possible if more freedom is given local offices of the Federal Government to discuss these matters with us. If so, we would recommend the adoption of such a policy. During recent years there has been a growing tendency on the part of Federal agencies, produced in part by the urging of both the national administration and the Congress, against making provision for future uses of water development projects.

The CHAIRMAN. I wonder if you will explain that statement?

Mr. KRONICK. I think I go on to do so, Senator, if you let me go and finish the paragraph. Then if you have any question I will be happy to try to answer it.

The CHAIRMAN. Go ahead.

Mr. KRONICK. The most ready example of this trend, of course, is in the field of water conservation where, although a project may provide immediate urgently needed flood protection, there are clearly substantial irrigation or municipal water benefits which can be enjoyed as soon as nearby areas develop a little more fully. We are trying to meet this situation in California in specific cases where no local agency is able to accept a repayment burden by having that burden assumed by the State government itself.

In this connection, Senator, I think Mr. Banks also mentioned the fact that the State is currently negotiating a repayment contract under which the State itself will assume responsibility for the conservation benefits of Black, Butte, and New Hogan projects. These projects are projects which were urgently needed for flood control purposes. However, the local agencies were not immediately in a position to assume the repayment responsibilities in connection with the conservation features. So in these two cases the State is assuming that responsibility.

The CHAIRMAN. Frankly, I thought great progress had been made in that field rather than the situation which I understood your statement to indicate where they had gone backward instead of forward.

Mr. KRONICK. I think progress is being made.

The CHAIRMAN. Last year the Congress in their Flood Control Act had in it a provision called the Water Supply Act of 1958 (title 3), of which I was a joint sponsor, which makes a very specific provision not only for planning additional space and resource for present demand for municipal and industrial water, but it makes a provision for space for what is indicated, not committed, by local agencies as to probable future demand and makes the provision of the act applicable not only to the projects now under construction or being constructed but also to existing projects. My own judgment is that would be in direct conflict with your statement that during recent years there has been a growing tendency on the part of Federal agencies, produced in part by the urging of both the national administration and the Congress, against making provisions for future uses of water development projects.

Mr. KRONICK. That which you say is in direct conflict. However, I was speaking specifically, Senator, of a situation in which flood control is immediately needed and multipurpose projects such as Black Butte and New Hogan. In those circumstances those two projects sat idly by although authorized some time ago, without being constructed, because there was nobody to assume——

The CHAIRMAN. There is quite a tendency down there on the part of the administration against the starting of construction of authorized projects, but I would hope——

Mr. KRONICK. This had nothing——

The CHAIRMAN. You referred to two projects you said had been authorized but nothing had been done to build them. I hope your feelings in that regard would not be directed at the Congress.

Mr. KRONICK. Not specifically, Senator. We were just concerned and we still are over the fact that some of these—I am speaking mostly of flood control projects, it appears that, and I will probably elaborate on this later, that we no sooner complete a flood control project when we find it is inadequate for its purposes and we have to replan and reauthorize. If we could plan more into the future I think it would be of benefit to all concerned and this mainly in connection with our multiple-purpose projects.

The CHAIRMAN. I would agree with that statement. But I would call your attention to the fact that it has not been easy to secure the construction of projects which have been constructed and they might not have been constructed at all had those sponsoring them waited until they could have gotten them constructed on the basis that would

enable them to meet the needs further out into the future rather than have them constructed on the basis of what they actually are.

Mr. KRONICK. It may be feasible to extend title 3 to other areas. My understanding is it applies only to municipal and industrial uses and not agriculture.

The CHAIRMAN. Of water stored in the reservoir?

Mr. KRONICK. Yes.

The CHAIRMAN. Yes.

Mr. KRONICK. We have this problem in connection with Black Butte and New Hogan in that there was the requirement that a local agency assume the responsibility for repaying the conservation or irrigation features of those two projects. Unless that were done we could not proceed.

The CHAIRMAN. Of course the provisions of the Federal law with reference to the reimbursement of the cost allocated to irrigation is the most favorable of any of the reimbursable costs.

Now, the title 3 provision with reference to reimbursement for municipal and industrial water it requires the repayment within 50 years plus interest, while as you know the provision with reference to reimbursement of irrigation cost first of all, makes no interest charges and secondly, many projects go far beyond the 50th year.

Mr. KRONICK. I think we resolved their problem in these two instances with States assuming the responsibilities where there was no immediate need for the water for conservation in those areas but there was an immediate need for flood protection.

How far we can go with this process we do not know. However, we find a great deal of reluctance in many cases for the Federal Government to assume any risk at all in this area. For example, a levee project may be designed to meet a given flood frequency and magnitude but without provisions for design which will provide the higher standard of protection certain to be necessary a few years in the future. Thus no more is a project complete than we find ourselves going again through the long process of further study, further authorization and further seeking of appropriations for project changes which all of us know will certainly be necessary in a short period of time. This is shortsighted and we feel should lead to adoption of a policy which will permit the Federal flood construction agencies to construct works which will not need modification almost as soon as they are completed.

Finally, we in California assure the committee of our continued cooperation in the development of sound flood control and water conservation projects. The State has expended a great many millions of dollars in its cooperative efforts with Federal agencies in the past. We expect to continue this cooperation in the future by acquiring rights-of-way for levee and channel improvement projects at as rapid a rate as the Federal Government will appropriate funds for project construction. We are seriously concerned with the fact that at the recent levels of appropriation, a great many years must elapse before presently authorized flood control works are completed. Just as we are moving with our large-scale State water program to meet statewide needs for water supplies, we expect to continue our efforts to protect from floods the living space we now occupy and to improve the quality of our land to carry the population growth we see coming

in the future. Since this growth and development will greatly aid the economic growth and development of the Nation, there certainly should be no policy of slowing up the national flood control effort. On the contrary, construction of needed flood protection works, on a cooperative Federal-State-local basis should be stepped up.

Senator KUCHEL. Thank you very much, Mr. Kronick, for a very interesting and helpful statement.

Mr. KRONICK. Thank you.

Senator KUCHEL. Gentlemen, any questions?

(The maps referred to appear here.)

Senator KUCHEL. The next witness is Mr. Hugh P. Dugan, the regional director of the Bureau of Reclamation.

STATEMENT OF HUGH P. DUGAN, REGIONAL DIRECTOR OF THE BUREAU OF RECLAMATION

Mr. DUGAN. You will receive from the Department a prepared statement and supplemental material that will cover all of our activities in some detail.

Senator KUCHEL. You are a representative of an agency which has contributed greatly in both northern and southern California to the present basis on which we have reached our high field. I am always glad to salute the Bureau of Reclamation.

Mr. DUGAN. Thank you, Senator.

Senator Kerr, Senator Young, and Senator Engle, my name is H. P. Dugan, regional director of region 2, Bureau of Reclamation, Sacramento, Calif.

It is a pleasure to appear before this Senate Select Committee on National Water Resources. The Bureau of Reclamation has played, and continues to play, a major part in the development of the water resources of the State of California. We have been active in this State since the establishment of the Bureau of Reclamation, beginning with the authorization of the Klamath project in Oregon and California in 1905.

The past reclamation program of the Bureau of Reclamation in California is related to what can and will be done in the future to develop water resources. For example, the Central Valley project authorized in 1937 and comprised of Shasta Dam, Keswick Dam, Delta Cross Channel, Contra Costa Canal, Tracy Pumping Plant, Delta-Mendota Canal, Friant Dam, Friant-Kern Canal, and Madera Canal is but a nucleus of the potential development of the Central Valley and the State of California.

Because past developments are so closely related to future potentialities, I will briefly review the reclamation program that has been accomplished as a prelude to our future prospects.

As I mentioned, the Bureau's work in California began with the Klamath project in Oregon and California. Over the years its facilities have been expanded until today about 200,000 acres of land in the area receive water from the project.

This project was followed shortly with the authorization of the Orland project serving some 20,000 acres in the Sacramento Valley. Initial delivery of water to lands in Glenn and Tehama Counties was made during the irrigation season of 1910. A nucleus of the poten-

DEPARTMENT OF WATER RESOURCES 1959

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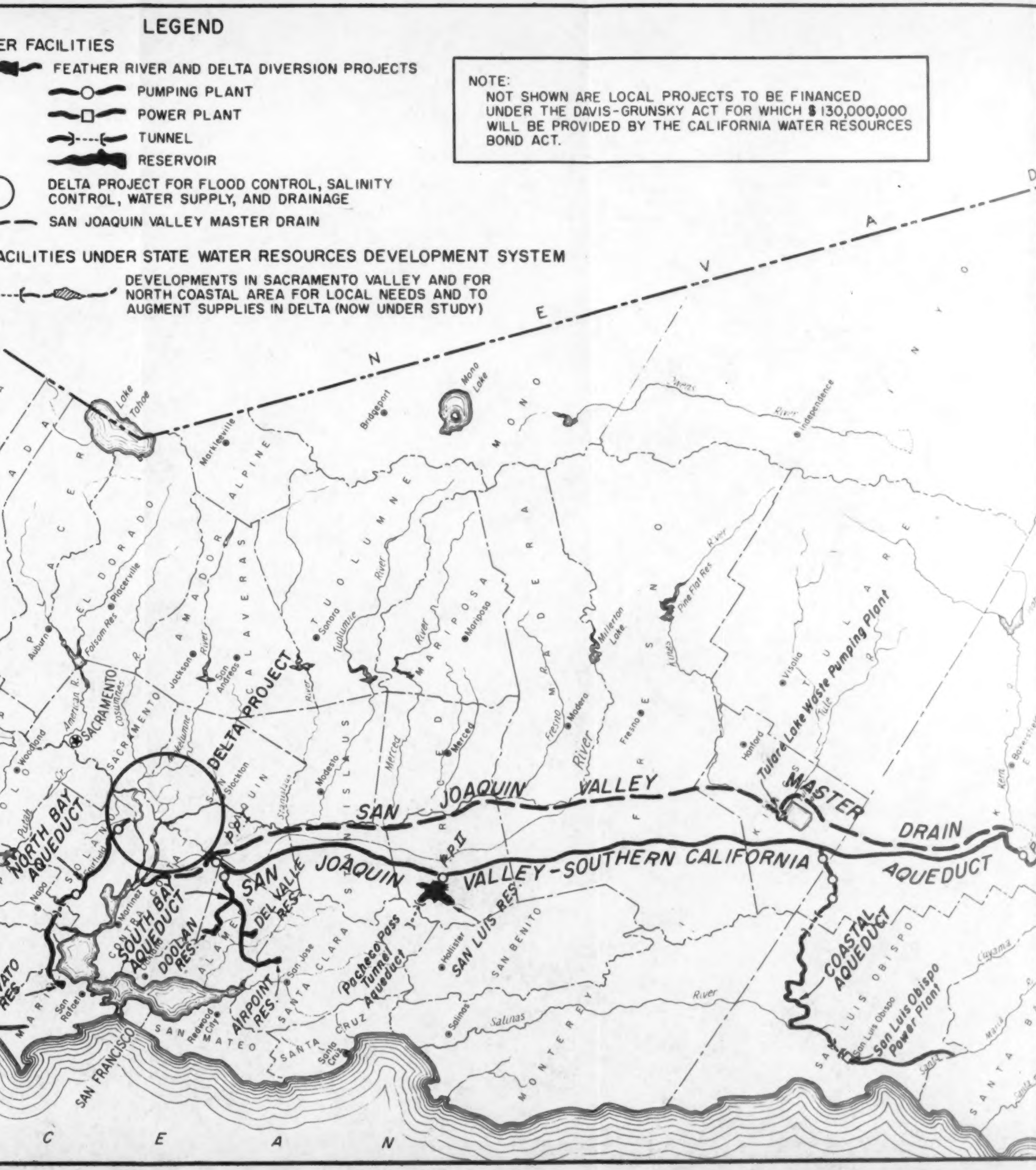
LEGEND
ER FACILITIES
FEATHER RIVER AND DELTA DIVERSION PROJECTS
PUMPING PLANT
POWER PLANT
TUNNEL
RESERVOIR
DELTA PROJECT FOR FLOOD CONTROL, SALINITY CONTROL, WATER SUPPLY, AND DRAINAGE
SAN JOAQUIN VALLEY MASTER DRAIN
ACILITIES UNDER STATE WATER RESOURCES DEVELOPMENT SYSTEM
DEVELOPMENTS IN SACRAMENTO VALLEY AND FOR NORTH COASTAL AREA FOR LOCAL NEEDS AND TO AUGMENT SUPPLIES IN DELTA (NOW UNDER STUDY)
NOTE:
NOT SHOWN ARE LOCAL PROJECTS TO BE FINANCED UNDER THE DAVIS-GRUNSKY ACT FOR WHICH $ 130,000,000 WILL BE PROVIDED BY THE CALIFORNIA WATER RESOURCES BOND ACT.
NEVADA
Lake Tahoe
Mono Lake
Bridgeport
Markleeville
Independence
SACRAMENTO
Auburn
Placerville
Folsom Res.
Jackson
San Andreas
Sonora
Mariposa
Merced
Modesto
Stockton
Madera
Millerton Lake
Pine Flat Res.
Fresno
Visalia
Hanford
Bakersfield
Woodland
Fairfield
Napa
Martinez
Oakland
San Rafael
SAN FRANCISCO
Redwood City
San Jose
Hollister
Salinas
Santa Cruz
San Luis Obispo
DELTA PROJECT
NORTH BAY AQUEDUCT
SOUTH BAY AQUEDUCT
DOOLAN RES.
DEL VALLE RES.
AIRPOINT RES.
SAN LUIS RES.
Pacheco Pass Tunnel Aqueduct
SAN JOAQUIN VALLEY MASTER DRAIN
SAN JOAQUIN VALLEY-SOUTHERN CALIFORNIA AQUEDUCT
Tulare Lake Waste Pumping Plant
COASTAL AQUEDUCT
San Luis Obispo Power Plant
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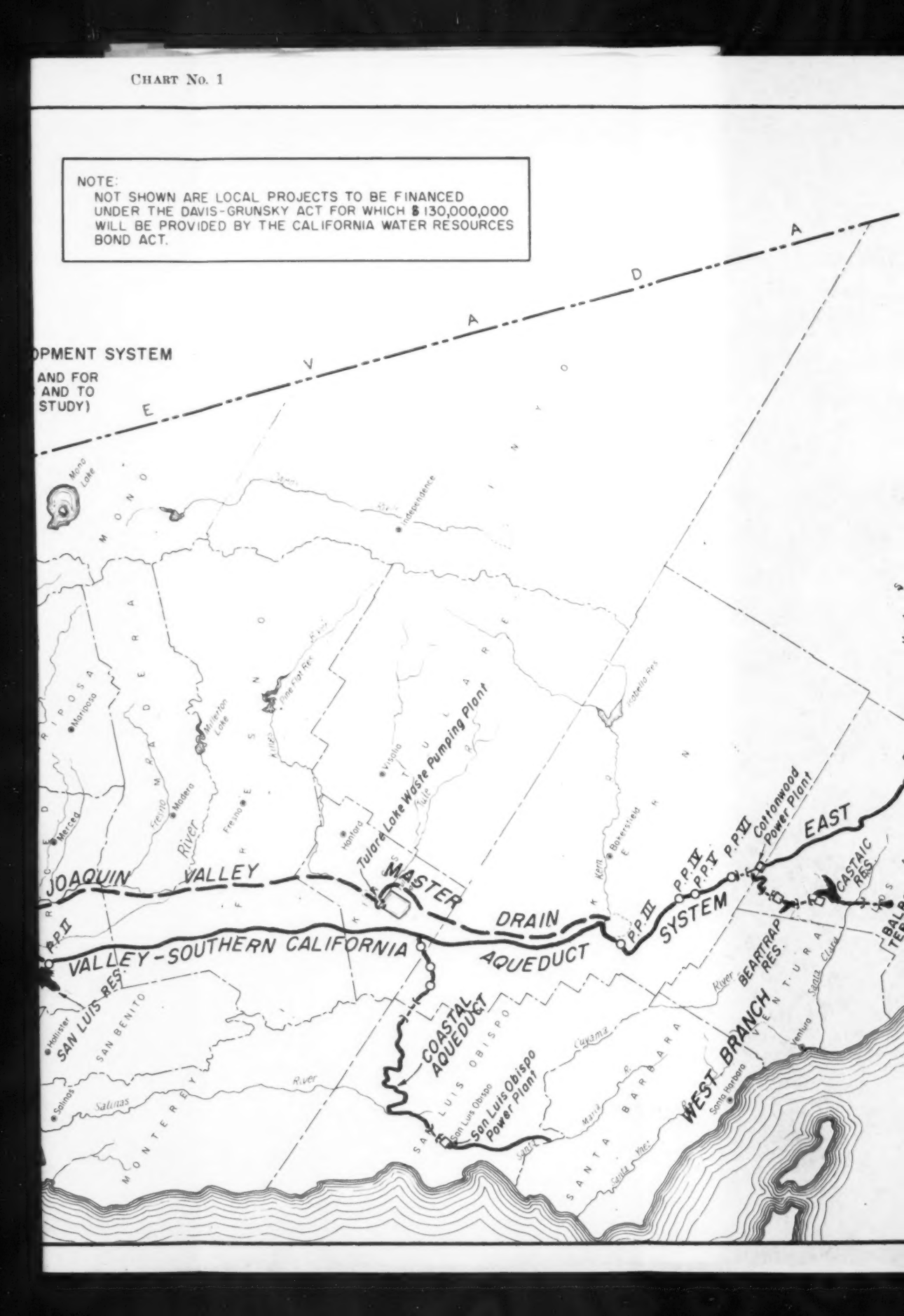
NOTE:
NOT SHOWN ARE LOCAL PROJECTS TO BE FINANCED UNDER THE DAVIS-GRUNSKY ACT FOR WHICH $130,000,000 WILL BE PROVIDED BY THE CALIFORNIA WATER RESOURCES BOND ACT.



STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

STATE WATER RESOURCES DEVELOPMENT SYSTEM

SCALE OF MILES
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MAJOR AND MINOR TRIBUTARIES
ANTELOPE CR.
ELDER CR.
THOMES CR.
DEER CR.
BUTTE CR.
SHASTA CO.
Tehama
Red Bluff
Paskenta
Henleyville
Corning
Orland
Willows
Artois
Maxwell
Princeton
Colusa
Williams
Arbuckle
Dunnigan
Woodland
Davis
Winters
Vacaville
Fairfield
Suisun
Benicia
Martinez
Pittsburg
Antioch
Oakley
Brentwood
Byron
Tracy
Manteau
Vernalis
Modesto
Ripon
Stockton
Lodi
Galt
Elk Grove
Sacramento
Folsom
Auburn
Roseville
Rocklin
Lincoln
Wheatland
Marysville
Yuba City
Oroville
Chico
Gridley
Biggs
Glenn
Willows
Orland
Corning
Tehama
Red Bluff
Paskenta
Henleyville
Lake Nacimiento
Stony Creek
Black Butte Res.
Tehama-Colusa Canal
Glenn-Colusa Irrigation District
Sacramento River
San Joaquin River
Delta
Suisun Bay
Carquinez Strait
San Pablo Bay
Mare Island Strait
Napa River
Napa
Petaluma
Sonoma
Sonoma Creek
Carquinez Bridge
Benicia-Martinez Bridge
Dumbarton Bridge
San Mateo Bridge
Richmond-San Rafael Bridge
Golden Gate Bridge
San Francisco
Oakland
Alameda
San Leandro
Hayward
Niles
Livermore
Pleasanton
Dublin
San Ramon
Walnut Creek
Concord
Martinez
Pittsburg
Antioch
Oakley
Brentwood
Byron
Tracy
Manteau
Vernalis
Modesto
Ripon
Stockton
Lodi
Galt
Elk Grove
Sacramento
Folsom
Auburn
Roseville
Rocklin
Lincoln
Wheatland
Marysville
Yuba City
Oroville
Chico
Gridley
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Glenn
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Tehama
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Paskenta
Henleyville
Lake Nacimiento
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Black Butte Res.
Tehama-Colusa Canal
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Sacramento River
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Suisun Bay
Carquinez Strait
San Pablo Bay
Mare Island Strait
Napa River
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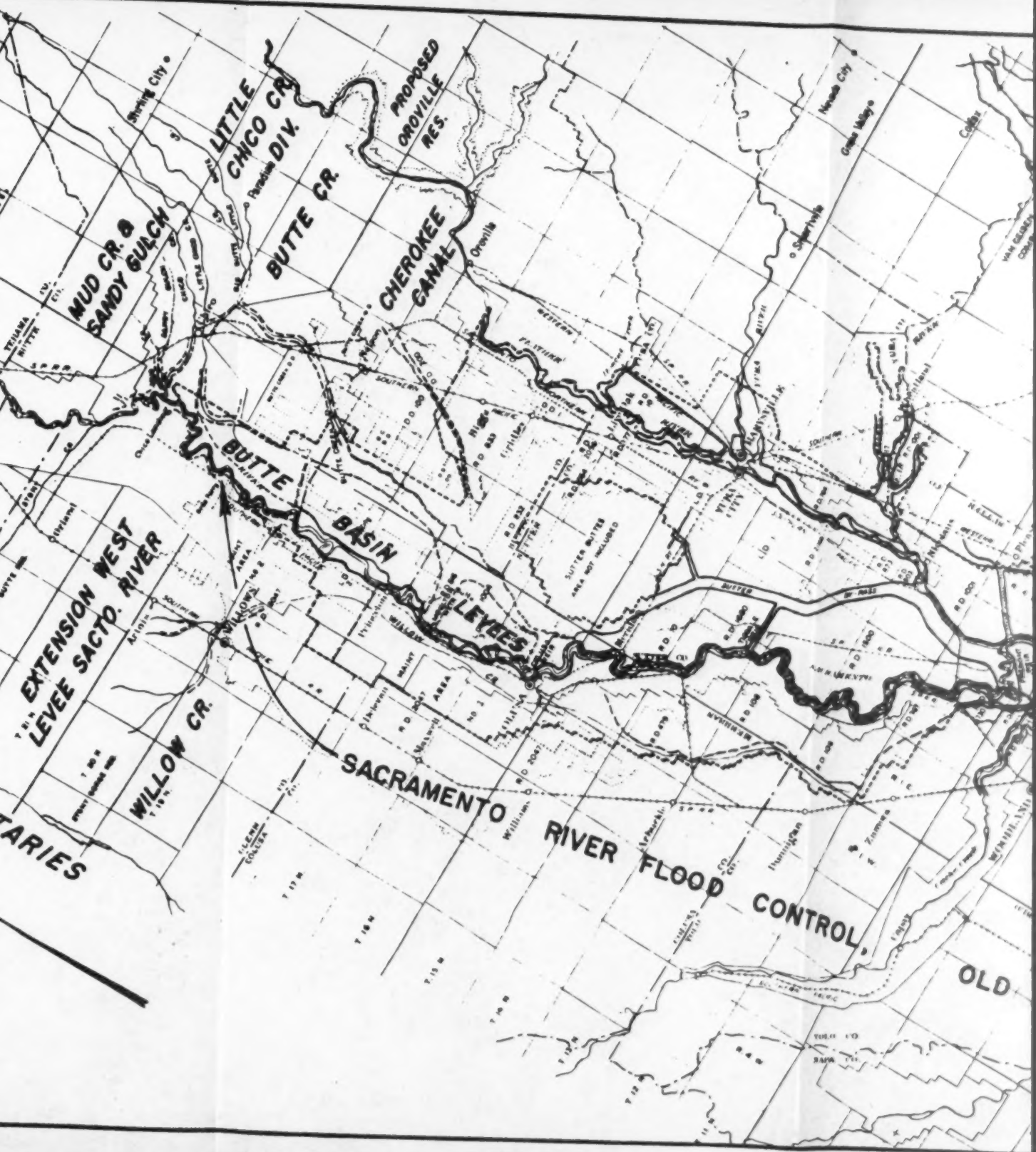
Petaluma
Sonoma
Sonoma Creek
Carquinez Bridge
Benicia-Martinez Bridge
Dumbarton Bridge
San Mateo Bridge
Richmond-San Rafael Bridge
Golden Gate Bridge
San Francisco
Oakland
Alameda
San Leandro
Hayward
Niles
Livermore
Pleasanton
Dublin
San Ramon
Walnut Creek
Concord
LEGEND
R.D. Reclamation District
D.D. Drainage District
L.D. Levee District
P.D. Protection District
Boundary Sacramento-San Joaquin Drainage District
Boundary American River Flood Control District


LITTLE CHICO CR.
PROPOSED OROVILLE RES.
MUD CR. & SANDY GULCH
BUTTE CR.
CHEROKEE CANAL
BUTTE BASIN
LEVEES
EXTENSION WEST LEVEE SACTO. RIVER
WILLOW CR.
SACRAMENTO RIVER FLOOD CONTROL
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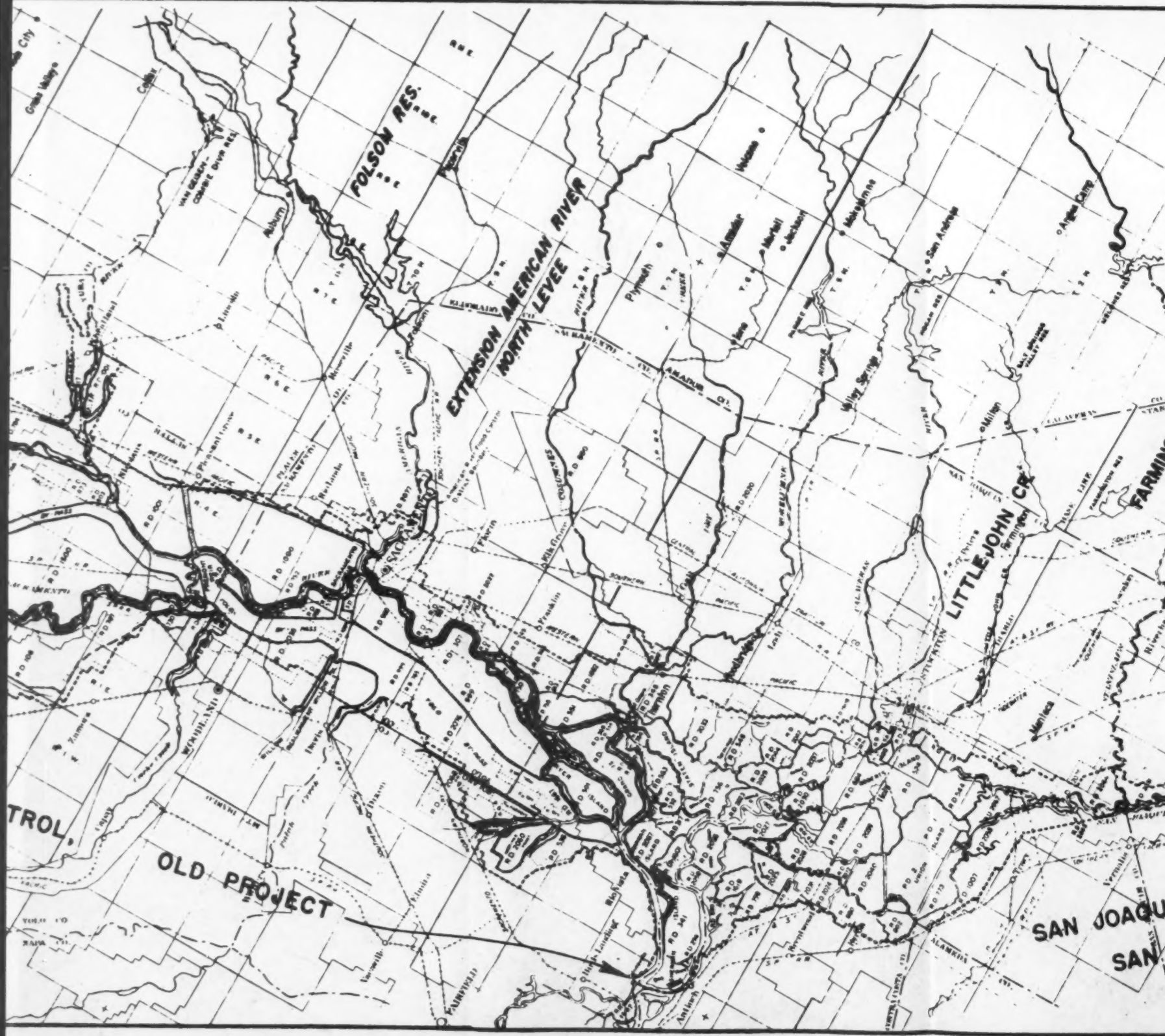
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NORTH LEVEE
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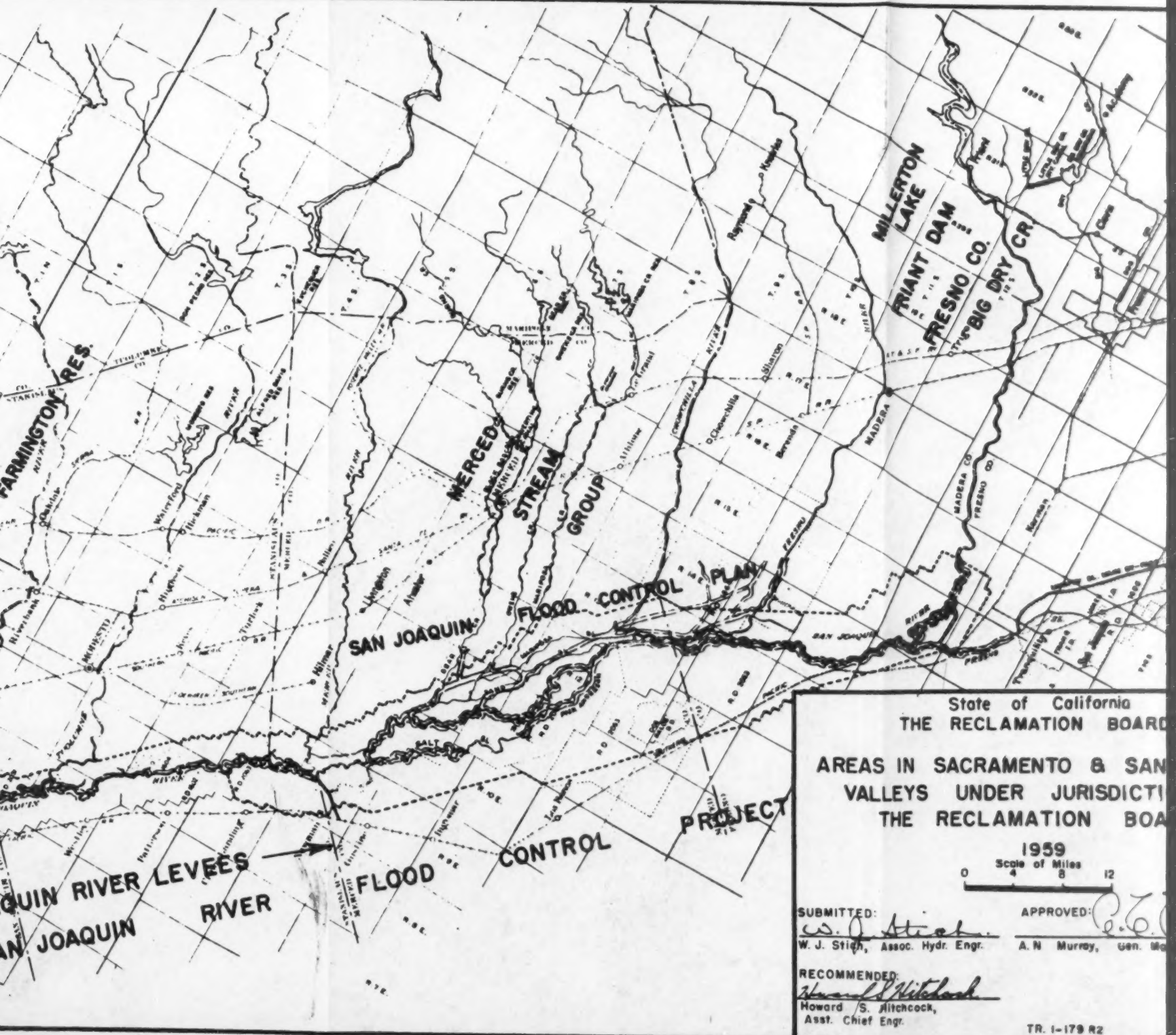

State of California
THE RECLAMATION BOARD

AREAS IN SACRAMENTO & SAN
VALLEYS UNDER JURISDICTI
THE RECLAMATION BOA

1959

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SUBMITTED:
W. J. Stich
W. J. Stich, Assoc. Hydr. Engr.

APPROVED:
A. N Murray, Gen. Ma

RECOMMENDED:
Howard S. Hitchcock
Howard S. Hitchcock,
Asst. Chief Engr.

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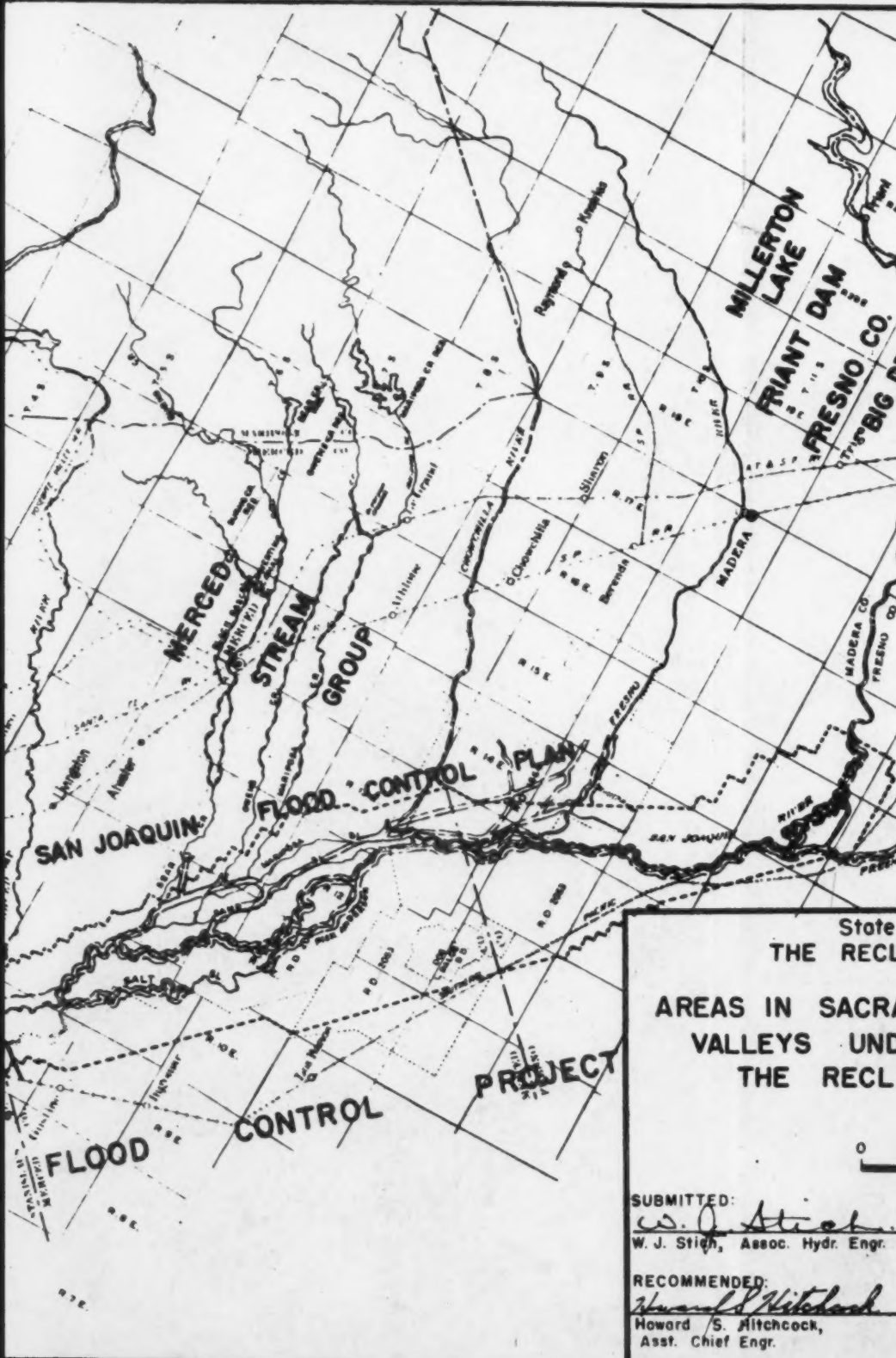

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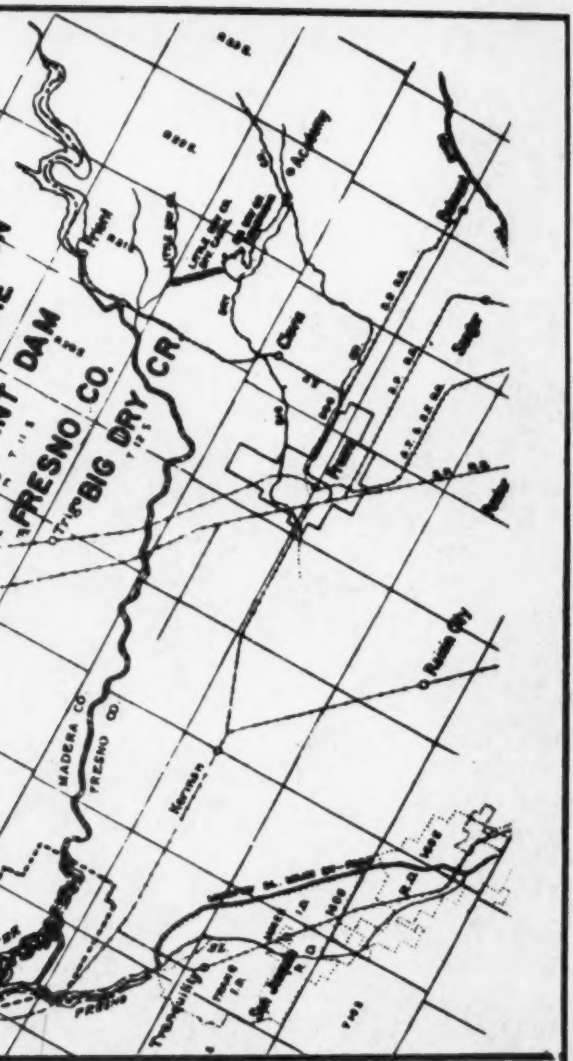

State of California
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SACRAMENTO & SAN JOAQUIN
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RECLAMATION BOARD

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Hydr. Engr. A. N Murray, Gen. Mgr. & Chief Engr.

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tial development in the Central Valley is the Central Valley project; because past developments are so closely related to future potentialities, I will briefly review the Bureau program that has been accomplished as a prelude.

The initial features of the Central Valley project were authorized as a Federal reclamation project in 1937.

The Solano project, 25 miles to the west, was authorized in 1949. Under this project, waters of Putah Creek are stored and diverted to the Putah South Canal to provide irrigation service to the Solano Irrigation District and municipal water service to the municipalities within Solano County. This project is nearing completion and the water users of the Solano Irrigation District have been able to use some project water during this past irrigation season.

Authorization of the Cachuma project in Santa Barbara County in 1948 led the way for several multiple-purpose projects on the south coast of California. This project has been completed and is now operated by the water users in Santa Barbara County. It provides irrigation and municipal water and incidental flood control.

In 1954 the Santa Maria project, also in Santa Barbara County, was authorized and construction was completed in 1958. This project regulates the flood waters of the Santa Maria River so as to provide flood control and to enhance stream bed percolation to better utilize the water resources within the Santa Maria Valley. This project also is operated and maintained by the water users.

Most recently authorized is the Ventura River project, located in Ventura County. This project, now 95 percent completed, will provide irrigation and municipal water to the Ventura River Muncipal Water District. Upon completion the project will be operated and maintained by the water users.

The major Federal reclamation project in California has been, as you all well know, the Central Valley project, initiated in 1937. This is an outstanding example of orderly stage development of water resources. The construction of multiple-purpose facilities on the project to meet the public needs of the past 20 years has been a major accomplishment. Almost $600 million have already been expended in the construction of the initial project and the several supplements that have been added to it as they have been required. When the presently authorized features of this project are completed, over $850 million will have been invested in the project. Ninety-four percent of this investment will be repaid by water and power users in keeping with the well-established precepts of reclamation law. The repayment to date far exceeds that estimated 10 years ago.

During the past year over 2,800,000 acre-feet of water was delivered through project facilities to 800,000 acres. The four powerplants produced over 3 billion kilowatt-hours. The Trinity River division, when completed, will provide an additional 369,000 kilowatts of generating capacity and will develop for agricultural use an average of 1,400,000 acre-feet of water annually. Net revenue for fiscal year just ended was over $8 million.

The current construction program in California of the Bureau of Reclamation calls for expenditure of almost $50 million for fiscal year 1960, of which the major portion will be spent for construction of the Trinity River division. Work will continue on the large Trinity Dam

and on the 11-mile-long Clear Creek Tunnel. Construction will start on Lewiston diversion dam, Lewiston fish facilities, Whiskeytown Dam, and the 3-mile-long Spring Creek Tunnel. Preconstruction work will be underway on the Trinity, Clear Creek, and Spring Creek powerplants.

The CHAIRMAN. I wonder if you would give me the specifications of that tunnel.

Mr. DUGAN. I am sorry. The investigation of the tunnel?

The CHAIRMAN. Specifications.

Mr. DUGAN. Oh, the specifications.

The CHAIRMAN. Where is it and at what elevation; what lift is involved in the water to be carried through it; from whence the water comes; where it will be diverted, if you would put that statement into the record?

Mr. DUGAN. I cannot give you all that detail from memory, Senator Kerr, but I will be glad to supplement the record with the specific details.

The CHAIRMAN. Fine.

Mr. DUGAN. The Bureau's general investigations program in this State will be carried on this fiscal year and in future years with vigor and dispatch as has been done in the past. This program is being fully coordinated with the plans and programs of the State. The development of California water resources is so monumental a task that the combined attention of the State, the Federal Government and the local agencies will be required if the waters of the State are going to be developed to meet the future water needs.

The Bureau of Reclamation is also working very closely with the Corps of Engineers in the investigation, construction, and operation of multiple-purpose projects to insure maximum conservation accomplishment.

Within region 2, current needs for water and future needs for water are in the Central Valley. To meet the requirements of those areas for which there is immediate urgency for supplemental water, the Bureau of Reclamation has completed plans by which the areas may obtain water from the Central Valley project. The principal area in California requiring immediate supplemental water service comprises approximately 500,000 acres situated on the west side of the San Joaquin Valley. To provide water urgently needed in this area, plans for the San Luis unit of the Central Valley project were developed. This project utilized to the maximum extent possible existing Central Valley project features and added off-channel storage and conveyance facilities which store and convey surplus winter waste water of the Sacramento River for use in the San Luis area. Certain elements of this basic plan were common to those of the Feather River project that is under construction by the State of California. This has resulted in the development of a proposed joint Federal-State venture in which certain of the facilities common to both plans will be constructed to the mutual benefit of both projects. The wisdom of the joint venture is well established and the Congress is presently considering authorization of the San Luis unit as part of a joint Federal-State venture. When constructed the unit will be able to function effectively because of the integration of waters made possible as a result of coordinated operation of the predominant Federal reservoir

system, together with such reservoirs as the State may construct to supplement existing stored water for overall use and export.

A second immediate need for water exists in Sacramento and San Joaquin Counties and involves an area of approximately 300,000 acres extending from the American River south to near the southern border of San Joaquin County. A plan of development to meet this area's water needs has been completed. Authorization for construction of the Folsom south unit would provide the conveyance facilities to deliver water from Folsom Reservoir and other existing Central Valley project facilities to the water short area. Existing Central Valley project features and the Folsom south unit can meet the water requirements of the area for a number of years in the immediate future. To meet the ultimate in the area's need for additional water, plans also have been completed. The Auburn unit, a reservoir located immediately above Folsom Dam, will provide the conservation storage necessary to fully meet all of the long-term requirements of the Folsom south service when it is fully developed. Authorization of Auburn Dam and the scheduling of its construction in time to meet the growing needs for water from the Central Valley project is a good example of proper and orderly water resource development.

A third area requiring immediate water service is located on the east side of the Sacramento Valley in northern Yolo County. Approximately 20,000 acres of land in the Yolo-Zamora area, located immediately below the service area of the authorized Sacramento Valley canals, is in urgent need for supplemental water. A plan has been developed to divert from the Sacramento River to meet the requirements of this area. Also proposed for authorization is the San Felipe division of the Central Valley project. The purpose of this addition to the project is to furnish water to portions of Santa Clara, San Benito and Santa Cruz and Monterey Counties. The plan proposes that water from the San Luis Reservoir of the San Luis unit be diverted by tunnel through the Diablo Range into the Pajaro River Valley and Santa Clara County. Details of this plan are now being perfected under a cooperative investigation with the tricounty authority, an organization of water users, in which half of the cost of the investigation is being paid by that agency.

Construction of these facilities and the State's Feather River project will supply most of the major needs for water in the Central Valley for the next 10 years.

The next important and most urgent requirement for imported supplemental water exists on the east side of the San Joaquin Valley, generally in the area now served by the existing Friant-Kern and Madera Canals of the Central Valley system. These initial features have not adequately met the long-time requirements for supplemental water in that area. As of this time, requests for an additional 1 million acre-feet per year have been received from the water users in the area. Plans are underway to meet this increased requirement in an orderly way. These plans will be completed in less than 2 years and are identified as the East Side division of the Central Valley project.

This planning program visualizes the need for the first delivery of water through the East Side system between 1967 and 1970. It anticipates full utilization of approximately 1,500,000 acre-feet of imported water by the service area within a 15-year period, or certainly by 1985.

The key feature of this proposed addition to the Central Valley project will be the East Side Canal, which extends from the American River southward to the San Joaquin River. Water for the planned addition will be obtained from surplus flows in the American, Sacramento, and Stanislaus Rivers. One new main-stream reservoir is proposed for integration into the East Side division. This is New Melones Dam and Reservoir, initially authorized to the Corps of Engineers for construction primarily as a flood-control project on the Stanislaus River. Construction of New Melones Dam and Reservoir with a capacity of about 2,400,000 acre-feet will provide a multipurpose facility that will provide both water and pumping power needed for the planned development. The plan proposes to divert American River water and surplus Sacramento River waters into the East Side Canal. Pumping systems along the canal and off-channel storage at Montgomery will lift and deliver a million and a half acre-feet of water to the San Joaquin River at about elevation 300 feet sea level. This water, temporarily stored behind proposed Figarden Dam on the San Joaquin River, will provide a pool from which water will be lifted by pumping approximately 150 feet into Friant-Kern Canal near Friant Dam. For many years available excess capacity in the Friant-Kern Canal and the utilization of off-channel storage at Hungry Hollow and Owens Mountain will adequately meet the supplemental needs of the area.

Thus, maximum use is made of existing project facilities. Additional works for storage, conveyance, pumping, or power development are constructed to meet the growth of the service areas.

To meet the increasing needs for water in the Central Valley between the years 1980 and 2000, future planning of the Central Valley project visualizes the need for at least an additional 2 million acre-feet of water. Of this supply, at least 1 million acre-feet of water will be required to augment the service provided by the East Side Canal to meet the growing needs of the San Joaquin Valley. The additional water will be required to meet increasing needs in the Sacramento Valley and increased economic development in the counties surrounding San Pablo and Suisun Bays and the Delta of the Sacramento and San Joaquin Rivers. Additional reservoirs and water storage will be the principal features involved in developing water supply for these future needs. Plans to meet these needs should be developed by 1970 so that certain of the key storage units that will be required can be placed under construction to provide water and hydroelectric power required for pumping much water to the areas of use.

Opportunities remaining for development of water supply for this purpose exists in the Yuba, Bear, American and Cosumnes River Basins where multiple-purpose reservoirs can be developed and integrated into the overall Central Valley storage system.

Other opportunities for development of water supply exist in the northwest California area. This area is the source of one-third of the total waters available in the State of California. It represents approximately one-sixth of the lands in California. The area affords the opportunity for the development of storage which can supply needed stream control and also allow export of surpluses for beneficial use within the Central Valley and other areas. Among the potential developments of this type would be the construction of additional storage on the Trinity River and diversion of surplus waters

into the Sacramento Valley. This follows the pattern of the Trinity River division that is presently under construction. Similar development of storage on the headwaters of the Middle Fork of the Eel River with transmountain diversion into Stony Creek also would provide a project beneficial to the regulation of the waters of the Eel River and export water into the Central Valley.

Although the next 20 years are highlighted with the prospects of major water resource developments in central California, there will be need for many small projects. The foothill and lower mountain areas will become increasingly populated. Water is the key to development and settlement of these foothill and lower mountain areas. We can well expect development of many small projects with storage and multiple purpose uses including domestic water, irrigation, and recreation. It is not unreasonable to expect that several hundred thousand acre-feet of water will be developed and utilized in these areas during the next 20 years.

The dynamics of the Central Valley project and the interrelationship of the existing features with plans of other agencies, such as the State of California and the flood control developments of the Corps of Engineers, illustrate the effectiveness of the project's conveyance system in integrating waters of all developments in the Central Valley. The interrelationship of all storage constructed in the Central Valley and the opportunity of integrating the waters from such storage, by virtue of the construction of large conveyance canals, is the backbone upon which the bountiful water accomplishments in the Central Valley will be realized. The orderly additions to existing facilities, in balance with the requirements for water in the Central Valley; the expansion of services from existing facilities, as requirements justify; and the repayment of the costs of the project by the beneficiaries, represent the finest example of progressive water resource development based on a sound repayment plan.

Senator KUCHEL. A very fine statement and it gives the committee an opportunity to see not only what has been constructed by the Department and the Bureau but what is contemplated.

Thank you very much, Mr. Dugan.

Any questions?

Senator ENGLE. Is Mr. Banks still in the room?

Mr. DUGAN. No, sir.

Senator KUCHEL. Will someone see whether Mr. Banks is still around?

Thank you, Mr. Dugan.

Mr. DUGAN. Thank you, Senator.

Senator KUCHEL. Mr. John Barnes, the Soil Conservation Service, Department of Agriculture.

STATEMENT OF JOHN S. BARNES, STATE CONSERVATIONIST, SOIL CONSERVATION SERVICE, CALIFORNIA

Mr. BARNES. Senator Kerr, Senator Kuchel, Senator Young, I am John Barnes, State conservationist of California of the Soil Conservation Service of the Department of Agriculture.

I have prepared here a statement on the status of the Soil Conservation Service activities in California as they bear on water resource

management. In the interest of conserving the time of your committee, unless you have questions I will file this statement with the committee, as I believe it contains all of the essential information.

Senator KUCHEL. Thank you, Mr. Barnes. We will be delighted to have the statement set forth in full. I give you my word that all these statements will be read and studied by the members of the committee.

(The statement referred to follows:)

STATEMENT OF JOHN S. BARNES, STATE CONSERVATIONIST, SOIL CONSERVATION SERVICE, CALIFORNIA

SUMMARY

The Soil Conservation Service carries out a broad program of soil and water conservation through its several authorities. All of its activities are performed cooperatively with local public districts, or in cooperation with other Federal agencies. It has no land management responsibiilties. All of its actiivties have dominant water conservation activity aspects. These fall into five general categories, as follows:

1. Flood prevention on the Los Angeles and Santa Ynez watersheds in Los Angeles and Santa Barbara Counties. These are 2 of the original 11 projects authorized by Congress under House Documents 426 and 518, 77th Congress, 1st session, the Omnibus Flood Control Act (Public Law 738, 74th Cong., 1936) and the Flood Control Act (Public Law 534, 78th Cong., 1944).

While a great deal has been accomplished on both of these projects, considerable work still remains to be done to carry them to completion.

2. *Pilot watersheds.*—We have two of these in California, authorized under Public Law 46, 74th Congress. These are the Walnut Creek project in Contra Costa County and the Calleguas Creek project in Ventura County. Work on these projects is moving ahead satisfactorily, in cooperation with the local agencies, but there still is considerable work to be done to bring them to completion.

3. *Watershed protection projects under Public Law 566–1018.*—We currently are working on the construction phase of five projects under this authorization. These are:

The Arroyo Grande in San Luis Obispo County, the Central Sonoma in Sonoma County, the Adobe Creek in Lake County, the Buena Vista Creek in San Diego County, and the Marsh-Kellogg Creek in Contra Costa County.

Work plans have been prepared for several additional projects which have not yet been approved for construction. Work plan preparation is going forward on a number of other projects, in cooperation with the State division of soil conservation and with local agencies. A considerable number of applications for assistance under this authorization have been received and are being investigated by the Service and the State division of soil conservation.

4. *Conservation operations.*—Under the Public Law 46 authorization, the Service is cooperating with 158 soil conservation districts and with the Imperial Irrigation District in planning and putting into effect soil and water conservation programs. Sixty-four percent of the gross area of the State is included in these districts, containing 24 million acres of farm and ranch land and 94,000 farms. Basic conservation plans have been prepared for 24,000 farms, covering 5,250,000 acres. There are important water conservation features on all of these plans.

5. *Cooperation with the agricultural conservation program.*—Under the authorization of the agricultural conservation program, the Soil Conservation Service furnishes technical assistance on the installation of permanent type practices through agreements with county ASC committees, where up to 5 percent of county ACP funds may be used to reimburse the Soil Conservation Service for this assistance. This work is being carried out in all agricultural counties in the State. The work is primarily of an engineering nature, involving water conservation.

More detailed information concerning these various programs follows:

FLOOD PREVENTION WATERSHEDS

Authority

House Document 518 and House Document 426, 77th Congress, 1st session, authorize work on the Santa Ynez and Los Angeles Rivers, respectively. Service responsibilities are covered in the Omnibus Flood Control Act (Public Law 738, 74th Cong., 1936), and the Flood Control Act (Public Law 534, 78th Cong., 1944).

Description of program

There are two flood prevention watersheds in this State—the Los Angeles River watershed and the Santa Ynez River watershed.

The Los Angeles River flood prevention project on agricultural land is made up of a series of debris basins with downstream channel improvements located in the San Fernando Valley, upstream of the principal flood prevention works of the Corps of Engineers and the Los Angeles County Flood Control District. In the San Gabriel Mountain area, the U.S. Forest Service program of fire protection and debris control complements the downstream programing of the Corps of Engineers and the Los Angeles County Flood Control District.

The Santa Ynez River flood prevention program consists of a series of debris basins with downstream channel improvements, offering protection to the agricultural lands and the community of Lompoc in the lower Santa Ynez Valley. Similarly, on this watershed, the U.S. Forest Service program of fire protection and debris control on the watershed lands of the Santa Ynez, with the Service program, complements the water conservation project of the Bureau of Reclamation and the Corps of Engineers' work on the Santa Ynez River.

Water resource aspects

These projects primarily are for soil and water conservation in the aid of flood prevention. They have been adapted as desired by the sponsors to provide open bottom channels to increase percolation into ground water tables and the stabilization of debris production areas in the watershed.

Status of watershed

Tabulated below are the obligations and accomplishments by watersheds. Obligations reported herein are subject to confirmation by our Washington, D.C., office.

Obligations in flood prevention watersheds

Name and county	Acres	Obligations to end of fiscal year 1959		Proposed obligations during fiscal year 1960		Estimate of project total (1958 prices)	
		Federal	Local	Federal	Local	Federal	Local
Los Angeles, Los Angeles	536,960	$10,650,045	$4,662,975	$1,596,503	$502,058	$21,444,869	$7,110,975
Santa Ynez River, San Luis Obispo	576,000	2,158,342	428,287	465,571	49,045	4,175,400	641,781
Total flood prevention	-------	12,808,387	5,091,262	2,062,074	551,103	25,620,269	7,752,756

Accomplishments in flood prevention watersheds

Measures	Unit	Los Angeles	Santa Ynez	Now on the land to date, June 30, 1959
STRUCTURAL				
Stream channel improvement	Mile	40.41	5.80	46.21
Stabilization and sediment control measures	Number	8	112	120
Stabilization of critical areas	Acre	32	127	159
Diversion construction	Mile		9.72	9.72
Floodway channel excavation	do		3.03	3.03
LAND TREATMENT				
Contour farming	Acre	485		485
Cover cropping	do	622	10,454	11,076
Cross-slope farming	do	511	3,395	3,906
Deferred grazing	do	5,144		5,144
Proper use	do	6,463	40,426	46,889
Range seeding	do	1,083		1,083
Wildlife area improvement	do	187		187
Check dams	Number	8		8
Drop spillway construction	do		395	395
Improved water application	Acre	323		323
Irrigation water management	do	1,011		1,011
Land leveling	do	4,742		4,742
Pond construction	Number	9	153	162
Terracing	Mile	23		23
Waterway development	Acre		13	13

PILOT WATERSHEDS

Authority

These projects are accomplished under the authority of the Soil Conservation Act (Public Law 46, 74th Cong., 1935) and the provisions of the 1954 Appropriation Act for the U.S. Department of Agriculture.

Description of program

There are two pilot watersheds in California—Calleguas Creek and Walnut Creek. These projects envision the establishment of the necessary land-treatment measures on the lands of the watershed, in conjunction with downstream flood regulation, debris detention structures, and channel improvements. In the populated areas in the watershed, the channels, in general, are lined ditches in combination with multipurpose flood and debris regulation structures, while the agricultural channel improvements are generally open-bottom channels with riprap-bank protection and concrete-stabilization structure.

Status to date

Tabulated below is the current status of obligations and accomplishments on these watersheds. Expenditures reported herein are subject to confirmation by our Washington, D.C., office.

Obligations in pilot watersheds

Name and county	Acres	Total obligations to end of fiscal year 1959		Proposed obligations during fiscal year 1960		Estimate of project total	
		Federal	Local	Federal	Local	Federal	Local
Calleguas Creek, Ventura County	215,680	$1,786,630	$1,741,388	$448,225	$300,634	$3,769,265	$4,532,193
Walnut Creek, Contra Costa County	95,600	2,540,997	1,536,286	707,578	598,652	4,541,658	3,573,417
Adobe Creek,[1] Lake County	21,500	50,740	46,173			50,740	46,173
Total pilot watersheds		4,378,367	3,323,847	1,255,803	899,286	8,361,663	8,151,783

[1] Adobe Creek pilot watershed canceled 1956.

Accomplishments in pilot watersheds

Measures	Unit	Walnut Creek	Calleguas	Total now on the land (June 30, 1959)
STRUCTURAL				
Floodwater retarding structures	Number	1	1	2
Stabilization and sediment control structures	do	9	209	218
Channel capacity improvement	Mile	1	12	13
Channel lining	do	1.4	3	4.4
Channel stabilization	do	6	22	28
Diversion dikes and ditches	do		3	3
Drop inlet structures	Number	8		8
LAND TREATMENT				
Channel improvement	Linear foot	.5	30.4	30.9
Channel lining	do		9.3	9.3
Contour farming	Acre		853	853
Cover cropping	do	1,539	11,541	13,080
Diversion construction	Mile		249	249
Erosion control structures	Number		781	781
Pasture and range seeding	Acre	1,135	21,363	22,498
Pond construction	Number	32		32
Proper use	Acre		96,254	96,254
Rotation grazing	do	500		500
Terracing	do		547	547
Wildlife area improvement	do	1,037		1,037

WATERSHED PROTECTION PROJECTS (PUBLIC LAWS 566, 1018)

Authority

The Soil Conservation Service has administrative leadership for Federal assistance to small watershed projects under the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Cong., 1954, as amended by Public Law 1018, 84th Cong., 1956).

Description of program

This act provides for technical and financial assistance by the Department of Agriculture to State or other local organizations for land treatment, flood prevention and the conservation, development, utilization, and disposal of water on watersheds up to 250,000 acres in size.

Projects under construction

Tabulated below are the obligations on the small watershed programs currently under construction in California. Expenditures reported herein are subject to confirmation by our Washington, D.C., office.

Project name and county	Acres	Obligations to end of fiscal year 1959		Proposed obligations during fiscal year 1960		Estimate of project total	
		Federal	Local	Federal	Local	Federal	Local
Arroyo Grande, San Luis Obispo County	103,400	$482,403	$393,198	$52,235	$14,474	$474,917	$422,176
Adobe Creek, Lake County	21,500	50,369	195,330	93,079	15,752	750,641	200,720
Central Sonoma, Sonoma County	50,000	1,369,901	1,194,144	528,020	507,280	9,599,500	2,080,400
Buena Vista Creek, San Diego County	8,970	65,820	57,402	51,410	24,287	986,670	617,000
Marsh-Kellogg Creek, Contra Costa County	116,420	0	0	190,100	124,900	3,366,000	2,576,200
Total watersheds		1,968,493	1,840,074	914,853	686,693	15,172,978	5,896,496

Projects being planned

Work plans are currently being prepared on the below listed projects as a cooperative undertaking between the sponsors and the Soil Conservation Service with assistance from the U.S. Forest Service and interested State agencies:

Name	County	Acres	Tentative date for submittal to congressional committee
Upper Chino Basin	San Bernardino and Riverside.	70,300	Under study for joint undertaking with Corps of Engineers.
Ulatis Creek	Solano	115,200	Not scheduled.
Green Canyon-Santa Maria.	Santa Barbara	74,550	Work plan turned down by local sponsors.
Carnadero-Llagas	Santa Clara	132,000	January 1961.
Escondido Creek	San Diego	30,700	March 15, 1960.
Napa River	Napa	242,900	Not scheduled.
Champlin Slough	Tehama	6,704	April 15, 1960.
Lewis Creek	Tulare	26,500	Not scheduled.

Applications for assistance under Public Law 566

The below listed applications have been received by the California Soil Conservation Commission for assistance under Public Law 566:

Name	County	Acres	Status
Sonoma Creek	Sonoma	100,000	Terminated.
Morrison Creek	Sacramento	31,700	
San Timoteo	San Bernadino and Riverside.	80,000	
Upper Perris Valley	Riverside	64,000	
Salt Creek	Riverside	100,000	
Bautista Creek	Riverside	46,000	
Smith Creek	Riverside	14,000	Terminated.
Small Canyon	San Bernardino	1,000	Canceled.
Avenue "H"	Los Angeles	11,500	
Antelope Creek	Tehama	72,000	Not eligible for assistance under Public Law 566.
Tule River	Tulare	247,000	
Monroe Canyon	Los Angeles	2,855	Not eligible for assistance under Public Law 566.
Firebaugh Drainage Enterprise No. 1.	Fresno	33,000	Superseded by Firebaugh-Los Banos Drainage Enterprise application.
Greenhorn and Spanish Creeks.	Plumas	128,500	
Cable and Devil Creeks	San Bernardino	25,800	
Morena Reservoir	San Diego	73,600	
Carmel River	Monterey	163,200	
Pescadero-Butano	San Mateo	39,500	
San Antonio Creek	Santa Barbara	103,000	Reconnaissance unfavorable.
Diaz Drainage area	Santa Barbara	2,146	Disapproved by Washington, D.C., office.
Mission Creek	Santa Barbara	7,200	Not eligible for assistance under Public Law 566.
Bear Creek	San Joaquin and Calaveras.	62,000	Being considered under U.S.E.D. program.
Bryant Canyon	Monterey	13,714	
Coachella Valley West Side Watershed project.	Riverside, Imperial, and San Diego.	122,500	Disapproved.
San Juan Ridge Ditch	Nevada	100,000	Not eligible for assistance under Public Law 566.
Upper Warm Creek	San Barnardino	20,300	
Firebaugh-Los Banos Drainage Enterprise.	Fresno	180,400	
Markleeville and Indian Creeks.	Alpine	41,600	Do.
Upper Tehachapi Creek	Kern	39,300	Reconnaissance study underway.
Laguna	Sonoma	113,000	
Alisal	Monterey	30,000	
Lewis Creek	Tulare	26,500	
Scotts Creek	Lake	56,000	Reconnaissance in progress.
Corralitos-Salsipuedes	Santa Cruz	41,000	
Little Panoche Creek	Fresno, Merced, and San Benito.	163,400	Do.

APPLICATIONS CURRENTLY BEING PREPARED (PUBLIC LAW 566)

Tentative name	County	Percent completed	Status
Butte Valley	Siskiyou	1	
Bear Creek	Shasta	1	
Willow Creek	Lassen	5	
Burch Creek	Tehama	75	Preapplication reconnaissance in progress.
Elder Creek	do	1	
Pacifica	San Mateo	5	
Zone NW-1	Santa Clara	75	
Fresno River	Madera	25	
Wahtoke Creek	Fresno	1	
Sierra	do	10	
Lemoore Drainage Enterprise	Kings	25	
North Fork	Tulare	15	
Pacheco Creek	San Benito	1	
Elkhorn	Monterey	5	
Goleta Basin	Santa Barbara	55	Do.
Massacre Canyon	Riverside	5	
Orchard Drive	Orange	95	Do.

ACCOMPLISHMENTS IN PUBLIC LAW 566 WATERSHEDS

Measures (structural)	Units	Arroyo Grande	Buena Vista	Marsh-Kellogg	Adobe Creek	Central Sonoma	Now on the land (June 30, 1959)
Stream channel improvement	Mile	3					3
Mechanized trails	Mile	21					21
Fire trails (land treatment)	Mile	13					13
Channel improvement	Mile				3	5	8
Cover cropping	Acre	193			4,448	1,039	5,487
Erosion control dams	Number					21	21
Diversion construction	Mile					2	2
Irrigation reservoirs	Number					18	18
Pasture and range seeding	Acre	5,335			1,021	5,658	12,014
Pond construction	Number	26			15	29	70
Proper use	Acre					24,529	24,529
Sprinkler irrigation systems	Number					2,311	2,311

CONSERVATION OPERATIONS AND COOPERATION WITH THE AGRICULTURAL CONSERVATION PROGRAM

The Service is working with 158 soil conservation districts in California which cover 64 million acres (64 percent of the State). These districts comprise 94,000 farms, covering 24 million acres (24 percent of the State). Basic farm plans have been prepared on 24,000 of these farms, covering 5,250,000 acres. Water conservation is a predominant problem on these farms in assistance furnished under the Service-District program, and under the permanent practice phase of the agricultural conservation program.

The Soil Conservation Service, through its assistance to soil conservation districts, and in doing the engineering for the Agricutural conservation program, helps individual farmers make more efficient use of their water resources. The irrigation water management part of this work can be divided into the following principal categories:

1. Development of new supplies of farm water.
2. Layout on reorganization of irrigation systems to get more efficient use of water.
3. Development and application techniques to get better efficiency from existing systems.
4. Disposal of irrigation waste waters.

The development fo new supplies of water for farms is accomplished primarily through the construction of farm ponds and reservoirs for stock water and irrigation.

Under these programs, about 7,300 farm ponds and 3,100 irrigation reservoirs have been constructed in California. The volume of storage behind the stock ponds is not significant, except from the standpoint of range use. The irrigation reservoirs store a total of about 50,000 acre-feet.

It is a well recognized fact that, coupled with the need for new sources of water for agriculture, is the need to use our existing supplies more efficiently.

In our program of assisting farmers to have a more efficient irrigation plant, we have helped them to accomplish the following improvements: Canal linings, 3,759,815 lineal feet; land leveling, 1,300,000 acres; number of sprinkler irrigation systems, 10,318.

(It is estimated that farmers are installing more than 800 miles of pipelines in California each year.)

Improved water management, using reorganized systems and improved operation, has been accomplished on 688,900 acres.

Water conservation also is accomplished through better operation of existing systems without reorganizing the systems. Such improved water application has accomplished on 1,052,500 acres.

The disposal of drainage wastes is a vital part of the total water management job. This service has assisted farmers in installing 890 miles of tile and other closed drains and 2,620 miles of open drains.

Soil survey data is required for both irrigation and drainage designs. This Service has completed soil surveys on 15,057,000 acres in California.

Senator KUCHEL. Are there any questions, gentlemen, on the program of the Soil Conservation Service?

Senator YOUNG. Gentlemen, I would like to ask one.

How many watershed projects do you have under construction now in California and how many applications do you have pending?

Mr. BARNES. Under Public Law 566 we have five in the construction stage. We have eight in the work plan development stage. We have 35 applications and we have a dozen proposals that are not yet formalized as applications.

Senator YOUNG. Thank you.

Senator KUCHEL. Thank you, sir.

Is General McDonald here, the division engineer of the Corps, accompanied by Colonel Morris?

General MCDONALD. We are.

STATEMENT OF BRIG. GEN. ROBERT McDONALD, ARMY ENGINEERS CORPS, ACCOMPANIED BY COL. HOWARD A. MORRIS

General MCDONALD. Thank you very much, sir. My division includes Los Angeles district, the Sacramento district, and the San Francisco district, as you know.

Senator KUCHEL. I would like to to say as one of the California Senators that your agency of the Government has always been most helpful to the people of California. I am glad to see that some of our jurisdictional problems have been solved.

General MCDONALD. Thank you very much, sir.

The CHAIRMAN. General, does your area include all of California?

General MCDONALD. Yes, sir, and Nevada and Utah and Arizona.

The CHAIRMAN. Also?

General MCDONALD. Yes, sir.

I have a written report, sir, and to save your time I think I could summarize it in about a minute.

Senator KUCHEL. Thank you, sir.

General MCDONALD. As to what the Corps has done, is doing, and planning to do, or has under investigation. In California we have completed some 25 flood-control projects.

The CHAIRMAN. Total cost?

General MCDONALD. The total cost is about $235 million, sir. There are 91 additional projects now under construction. Their total cost

is estimated will run about $370 million, sir. There are eight projects that are authorized that are not under construction, and their total cost will be about $165 million.

As an indication of how far along the road we are with the circumstances as they are at the present, we have outstanding 67 flood control investigations or review reports. They potentially could represent as much as $700 million as projects if they came to that point.

The CHAIRMAN. How near would that, authorized and developed together with the others, bring under construction and authorized?

General MCDONALD. If they exist?

The CHAIRMAN. Comprise in total of availability.

General MCDONALD. If they existed today, sir, they would probably reach perhaps a 75-percent solution of the situation.

The CHAIRMAN. In the State?

General MCDONALD. Yes, sir.

The CHAIRMAN. That would contemplate a static——

General MCDONALD. A static economy.

The CHAIRMAN. A forceful program by the Bureau?

General MCDONALD. Yes, sir. My answer also would imply a static economy, which is also not the case.

The CHAIRMAN. Say that again.

General MCDONALD. A static economy. By the time these projects come to the construction stage there will be others because of urban development and other reasons.

The CHAIRMAN. You don't contemplate a static economy here in this country, do you, General?

General MCDONALD. No, sir; I certainly don't.

The CHAIRMAN. I think there are some who not only contemplate it but yen for it. I am happy to say that that does not apply to any member of this committee.

General MCDONALD. No, sir.

I should say just a word, sir, about cooperation with the other agencies, Federal and State.

We enjoy very fine relationships with them. In some projects we work almost on a half and half basis. Those that are primarily navigation or flood control, we take the initiative, but we get full cooperation from the State and from the Federal agencies and we look forward to assisting in the already remarkable progress that they have made toward the complete development of the water resources of California.

Thank you very much, sir.

Senator KUCHEL. Any questions?

Thank you very much, General. Your written statement will be presented herewith.

STATEMENT OF BRIG. GEN. ROBERT MCDONALD, CORPS OF ARMY ENGINEERS

CORPS' ACTIVITIES AFFECTING WATER RESOURCES IN CALIFORNIA

Introduction

1. This presentation primarily is limited to a brief discussion of the Corps of Engineers' flood-control program in California and how that program affects the water resources in California; a discussion of the Water Supply Act of 1958 and how the development of municipal and industrial water supplies may fit into the Corps' program; a discussion of the Corps' coordination with other Federal agencies, the State of California, and local entities to insure that any project

recommended for construction fully develops the multiple-purpose potential of that project and creates a minimum of adverse effects; and the activities of the Corps with respect to flood plain zoning.

2. *Data inclosed.*—Inclosed with this discussion for your information is a pamphlet entitled "Water Resources Development by the U.S. Army Corps of Engineers in California." Also inclosed is a table showing the status of flood control projects that have been authorized by Congress and their effect on water resources, and a table listing the preauthorization flood control studies that have been assigned in California with the estimated probable date of completion assuming adequate funding or a notation as to status if the study has been completed but not yet acted upon by the Congress.

3. Any additional detailed information that may be desired by the committee in addition to that furnished herein or supplied by the Chief of Engineers will be furnished on request of the committee.

4. *Importance of water resources.*—Water resources along with land, forests, and minerals, constitute the basic resources of this country. The Corps of Engineers together with other Federal agencies must necessarily have a large interest in the conservation and development of this resource. States and local entities also have a large interest as they are the most direct beneficiaries of any works of improvement and their economy and future development may depend on water. Close coordination must be exercised between Federal-State-local interests to insure the proper planning of each project to yield the development of that project to its maximum economic possibilities. Here in California, we are most fortunate in that the State takes such an active role in the development of its water resources and has adopted an overall plan to distribute the available water so as to insure an adequate supply to all parts of the State, even under conditions of development many years in the future. We in the Corps of Engineers recognize the State's role in this field and are making every effort to insure that all flood-control works constructed or planned will fit into these overall State plans.

5. *Project formulation.*—All projects must be economically justified. In formulating multipurpose projects for flood control, water conservation, and power, the project is developed to the point where benefits are maximized, that is, to the point where the next added increment would no longer be justified by the benefits it would produce. In applying this principle, we have not always been able to justify the degree of flood protection or to conserve the last amount of water that may eventually be necessary or possible. As conditions develop, it may prove that in the future it may be found economically feasible to go back and provide additional protection or additional water conservation.

Authorized projects

6. Although many works have been completed or are presently under construction for the control of floods in California, the problem is by no means solved as is evidenced by the long list of authorized studies shown in attachment 2. For example, in the northern California coastal streams area, about $68 million in damage was caused by floods of 1955 and 1956. Additional damage has been caused by floods subsequent to that. The principal works for the control of floods in these areas that have been completed since that flood consist of the San Lorenzo River channel improvement, Coyote Dam on Russian River, and relatively minor channel improvment in the vicinity of Sandy Prairie on Eel River. Had these works been completed prior to the 1955–56 floods, it is probable that something on the order of $10 million in damages could have been prevented. Most of these preventable damages would have been on the San Lorenzo River in the city of Santa Cruz. These figures show that the flood problems in California will be with us for a long time although great strides have been made toward their solution, especially on the Sacramento and San Joaquin Rivers and in the Los Angeles area.

7. *Completed projects.*—As of now, 25 flood control projects and debris control projects or major units of projects have been completed in California. Three of the projects are large multipurpose projects for water conservation and storage and recreation facilities as well as flood control. One project includes power. Many of the others provide incidental conservation such as retarding runoff to permit added percolation into the ground water. Two debris control projects provide for power generation and recreational benefits. Many projects are extensively used for recreational purposes.

8. *Projects under construction.*—Nineteen additional projects are actively under construction. These include five large multipurpose reservoirs providing water conservation and recreation as well as flood control. Many of the others will include incidental conservation and recreation benefits. One of the projects is a cooperative arrangement with the city of San Francisco whereby the city constructs the reservoirs for municipal water supply and the corps reimburses the city for the share of the cost to be allocated to flood control storage made available. A similar arrangement is under consideration for use in other localities.

9. *Authorized but not started.*—An additional eight projects are authorized but not yet under construction although some are funded to start this fiscal year. Two of these projects will be constructed by local interests with Federal participation in the cost for flood control.

10. These projects are all described in some detail in attachment 1, the pamphlet on "Water Resources Development by the U.S. Army Corps of Engineers in California." The cost of new construction and maintenance through fiscal year 1958 for those flood control and debris control projects listed as completed in attachment 1 is on the order of $235 million. The latest estimate (July 1959) of cost to the Federal Government for those projects listed as under construction approximates $570 million. The estimated cost of work not yet started is in the order of $165 million. Of this amount, in the order of $50 million would be a cash contribution to the State of California for the flood control features to be incorporated in Oroville Reservoir on Feather River.

Investigations

11. Despite this indicated cost totalling nearly $1 billion, the studies presently authorized, as listed in attachment 2, could result in additional construction on the order of $700 million. This last figure is given only as an indication of the magnitude of presently known flood problems remaining to be solved.

Water Supply Act of 1958

12. Water supply is of vital importance to the national economy and security. The corps' policy has been and is to give it full attention in the planning of projects consistent with legislative expressions of interest and association of water supply with other project purposes.

Under section 6 of the Flood Control Act of 1944, the Secretary of the Army is authorized to make contracts with States and local entities for domestic and industrial use of surplus water at corps' projects. Under the Civil Appropriations Act of 1938, approved July 19, 1937, reservoir plans may be modified to provide additional storage capacity for domestic water, or other conservation use, provided the cost is contributed by local interests in advance of construction.

13. The population of the State of California is now about 15 million persons. Various forecasts of population trends place the population at about 60 million persons in the year 2010. With the rapidly increasing population in California and the indication that such increase will continue at an accelerating rate, the Water Supply Act of 1958 becomes of great importance. This act states that the Federal agencies should cooperate with State and local interests in developing water supplies for domestic, municipal, industrial, and other purposes in connection with Federal projects for navigation, flood control, irrigation, and other purposes. In general, this has always been done. However, the act makes provision for anticipating future demand or need for municipal or industrial water and for deferral of repayment of costs allocated to future needs.

14. *Corps' policy.*—The Water Supply Act of 1958 authorized incorporation of water supply storage in Federal projects subject to recognition of the primary responsibilities of the States and local interests in the development of water supplies. In this connection, it is corps' policy to recognize State water rights and water-right law. Corps' policy is to use the 1958 act as the basic authority in water supply planning in the survey program. Exceptions might be made under unusual circumstances and after prior approval of the Chief of Engineers. The water supply services to be provided by the corps will normally consist of space in a reservoir for use in regulating the flow of water so that it is useful for water supply purposes, and the provision, where necessary, of facilities in the project structures to provide for the release of stored waters for water supply purposes. Facilities for taking the water from the reservoir, which can be pro-

vided separately from the project structures, and facilities for transporting the water to the point of use are provided by the water users. These facilities can be provided at such time as the water is required.

15. Application of the Water Supply Act of 1958 should afford an opportunity to build for the future and in many cases to secure needed flood protection now with the water supply costs to be paid at such time as water use will commence. On occasion, this could mean the difference between construction of a channel improvement with only incidental conservation benefit or a higher cost multipurpose reservoir that would permit full development of the water resource potential of a watershed for future use with ultimate lower cost for both flood control and water conservation.

Coordination with other agencies

16. *General.*—Adequate coordination with other Federal and non-Federal agencies is recognized as a basic and essential part of the civil works mission of the corps, which must be given sufficient time and effort at all levels of investigation for its successful accomplishment. In addition to the interagency coordination and cooperation specified in existing Federal laws, many formal agreements have been consummated with other Federal and non-Federal agencies to facilitate coordination of interrelated interests and programs, and numerous procedures of both formal and informal nature are used in field level coordination of our water resources activities. We have two principal written guides of a comprehensive nature which govern our overall coordination activities. It appears that these guides, which are listed as items a and b below, might be useful to the committee for reference purposes. Accordingly, if these items have not been obtained by the committee as yet, it is suggested that copies may be obtained from the Office of the Chief of Engineers.

(a) *Engineering manual for examination and surveys, general procedures (EM 1120–2101).*—Sections X and XI of this manual are pertinent to the matter of interagency coordination and contain an outline of the policies and procedures of the corps in some detail. A copy of sections X and XI is enclosed as attachment 4. However, it should be noted that the list of statutes and agreements in paragraph 1—141b thereof is not completely up to date and that several recent items of significance should be added including:

(1) Act approved August 12, 158 (Public Law 624, 85th Cong., 2d sess.), Fish and Wildlife Coordination Act.

(2) Agreement between Departments of the Interior and Army concerning division of responsibilities in the Central Valley of California, dated December 29, 1958.

(3) Agreement between Departments of Agriculture and Army concerning participation in urban flood protection, dated January 19, 1959.

(b) *Policies and procedures for distribution and coordination of reports, revised July 1958 (agreement among agencies represented on interagency committee on water resources).*—In addition to containing a statement of the policies and procedures, this pamphlet lists all participating agencies together with a brief of the primary responsibilities of each.

17. *Agreements pertaining to water supply conservation.*—Since it is understood that this committee is primarily interested in the general subject of water conservation, the principal coordinating agreements bearing on that matter are briefly discussed as follows:

(a) *Interior-Army jurisdictional agreement for Central Valley of California.*—This recent agreement of December 29, 1958, defines principles, procedures, and designations of responsibility in planning and carrying out Federal water resource developments in the Sacramento and San Joaquin River Basins (Central Valley). It relates to the planning, construction, and project operation activities authorized and undertaken by the Bureau of Reclamation and the Corps of Engineers. Officials of the State of California Department of Water Resources were consulted in its preparation. Both Federal agencies will continue to cooperate closely with the State toward the common goal of optimum development of California's available water resources, involving projects undertaken by the State as well as by the Federal agencies. All beneficial purposes which can be served by water resource development to obtain maximum sustained public benefits will be fully considered. In the investigation and planning of projects, the Corps of Engineers will take the initiative to provide for needed flood control and navigation, while the Bureau of Reclamation will take the initiative to

provide for needed irrigation. The Secretary of the Interior, through the Bureau of Reclamation, will be responsible for marketing of all irrigation water. The constructing agency will be responsible for marketing all municipal and industrial water, except when such water must be interchanged or commingled with the water from the Central Valley reclamation project, in which case the Secretary of the Interior shall be responsible. The agreement assigns jurisdiction for the completion of planning, seeking of authorization, construction, and operation of certain specific projects, but such jurisdiction for other projects is deferred pending further planning and future actions by the State and local interests. Pursuant to the above agreement, negotiation of contracts has recently been undertaken by the Bureau for marketing the prospective water supply from two reservoirs in the Central Valley on which construction is to be initiated by the Corps of Engineers as soon as the contracts are executed. The initial construction funds for these projects, Black Butte Reservoir on Stony Creek and New Hogan Reservoir on Calaveras River, have been appropriated by Congress with the proviso that construction may not be initiated until the water contracts are consummated.

(b) *Agreement with Department of Health, Education, and Welfare relative to Water Supply Act of 1958.*—The purpose of this agreement, dated November 4, 1958, is to provide for assistance from the U.S. Public Health Service in implementing the Water Supply Act of 1958 (title III, Public Law 500, 85th Cong.). Essentially, it provides for obtaining advice and assistance, including a report, from the Public Health Service on proposed corps' projects in which provisions for municipal and industrial water supply may be feasible The Public Health Service will appropriately coordinate its reports with the States and other interests involved. That Agency will obtain funds through its own budgeting procedures to provide the necessary staff and resources for normal cooperation under the agreement, but the corps may also assign funds for special studies by the Public Health Service in certain cases by transfer from its appropriations. Further implementing agreements have been made between the division office of the corps and the regional office of the Public Health Service to facilitate the cooperation. Arrangements have been made for the district offices to deal directly with the field office of the Public Health Service in carrying out the agreement.

18. *Other means of coordination.*—As previously indicated herein, many methods of a formal and informal nature are used to insure adequate coordination with all interested agencies and individuals. Some of these are mentioned as follows:

(a) *Pacific Southwest Interagency Committee.*—This committee, which is a regional element of the national Interagency Committee on Water Resources, holds four meetings per year for broad discussions with a view to solution of joint problems. The committee and its subcommittees comprise representatives of the States as well as Federal agencies including the Corps of Engineers. The purpose of the committee is to provide in the Pacific Southwest region of the United States effective administrative procedures and techniques for the coordination of the technical activities, and the policies and programs of the Departments of the Interior; Agriculture; Commerce; Health, Education, and Welfare; the Army; the Federal Power Commission; and the various States in the fields of water and related land resources investigation, planning, construction, and operation and maintenance; to provide means by which conflicts may be resolved; and to provide procedures for coordination of their interests with those of other public and private agencies in the water and related land resources field. The various technical subcommittees are essentially research and research coordination committees, which also disseminate the information acquired and are in a position to suggest improved techniques in their respective fields to the participating agencies.

(b) *Regular meetings between principal field officials.*—This procedure has been found useful where there is need for periodic discussion of joint problems in a local area, such as a single State, for example. The quarterly meetings of the California State-Federal Interagency Group is an example of this type which regularly brings together the director of the California Department of Water Resources, the regional heads of the Bureau of Reclamation and the Soil Conservation Service, and the South Pacific division engineer of the corps.

(c) *Public hearings and field level review of reports.*—As a matter of standard practice, all agencies considered to have possible interest are advised when

study of a new problem area is to be initiated, and such liaison as mutually considered necessary is maintained throughout the planning stage. Normally, a public hearing is held at field level when a prospective project plan has been formulated so as to obtain and consider the views of all concerned. Subsequent thereto, a draft of the report for such plan is distributed to the field offices of all agencies having principal interest for comments prior to submittal of the report to Washington headqquarters. Such field level processing tends to facilitate final coordination at Washington level.

(d) *Joint treatment of basin problems.*—Occasionally, it is found advisable to reach agremeent between agencies so as to accomplish joint work for solution of the problems of a stream. In such cases, agreements, usually of an informal or semiformal nature, are made to avoid overlapping and duplication of work.

(e) *Transfer of funds for specialized studies.*—In order to take advantage of special knowledge and skills available from existing staffs of other agencies, corps' funds are sometimes transferred to other agencies to have studies made pertaining to their fields of specialization. Action of this type is particularly notable in connection with the San Francisco Bay study in progress by the San Francisco district of the corps, in which case assistance of many other agencies is being enlisted on the above basis.

(f) *Miscellaneous.*—Considerable coordination activity, particularly between the corps and the Bureau of Reclamation, is involved in fulfilling the directive in section 7 of the 1944 Flood Control Act which requires that operating rules and regulations be prepared by the Corps of Engineers for all reservoirs, involving storage allocations to flood control or navigation purposes, which are constructed wholly or partly with Federal funds provided for such purposes.

This function also applies to certain non-Federal reservoirs which are being constructed by local agencies to an increasing extent in recent years partly with Federal funds provided on the basis of flood protection to be afforded thereby. Other types of coordination with local interests include the obtaining of necesary agreements to insure fulfillment of the local responsibilities in local flood control projects. A notable example of such an agreement is the detailed memorandum of understanding entered into by the Corps of Engineers and the California State Reclamation Board in 1953 to define the joint responsibilities associated with the completion, and the acceptance by the local interests for maintenance and operation, of the complex Sacramento River flood control project.

Flood plain zoning

19. Recently, the subject of flood plain zoning has attracted much attention. On occasion, damages sustained in flood plains under the present stage of development do not justify the construction of works to prevent those damages. Further, the potential economic loss through development of alternative sites for local economic development also may be insufficient to warrant the cost of protection. However, if allowed, development may take place within the flood plains to an extent that protection becomes marginal and a demand immediately arises for the protection to be provided. In some instances, flood plain areas may become so developed as to make upstream projects inoperable or at least restrict operation. These conditions could be avoided through a proper and carefully planned application of zoning.

20. Zoning of this nature would take into consideration the highest land use practicable without materially increasing the flood damage and the kind of construction that could be permitted and which would not be susceptible to damage in time of flood. The adoption of zoning could reduce the future cost of flood control without adverse effect on the economy as a whole. If at any time the adverse effect of zoning should justify the cost of flood protection, the zoning requirements could be modified readily. In the meantime, the development of the water resources of tributary basins may provide sufficient incidental flood protection as to permit the removal of zoning restrictions without necessity for flood control.

21. The corps did consider the desirability of zoning in the authorized project on Sacramento River from Chico Landing to Red Bluff. Congress authorized intermittent bank protection and incorporated the entire reach into the project for the purpose of flood plain zoning. It is expected that this principle will be given greater consideration in future planning. Finally, as the water conservation problems become more acute, all potential reservoir sites must be adequately protected to insure their future availability by zoning or by acquisition

of the sites. This practice also would reduce the cost of future channel improvements for flood control.

Flood control studies in California

Name of report	Location	Completion date	Type of improvement
LOS ANGELES DISTRICT			
Antelope Valley	Los Angeles and Kern Counties.	1964	
Arroya Grande Creek	San Luis Obispo	After 1964	
Laguna Canyon	Los Angeles County	do	
Laguna Dominguez	do	do	
Salton Sea Inlet Streams	San Diego and Imperial Counties.	do	Channel.
San Diego River	Mission Valley	1962	Do.
San Luis Rey River	San Diego County	After 1964	Reservoir.
Santa Ynez River and Tributaries	Santa Barbara	1961	Channel.
Switzer Creek	San Diego County	1964	Do.
White Water River	Riverside and San Bernardino Counties.	1962	Reservoir.
Santa Ana River, University Wash, Springbrook Drainage.	Orange County	1963	
SACRAMENTO DISTRICT			
Bear Creek	San Joaquin County	April 1959 submitted	Channel.
Bear River (Garden Bar)	Sacramento River and tributaries.	1964	Reservoir.
Big Valley	Lassen County	do	
Buchanan Reservoir	Chowchilla River	June 1961	Do.
Bullards Bar	Yuba River	June 1962	Do.
Cache Creek	Yolo County	1964 or later	
Caliente Creek Stream Group	Kern River	do	
Carson River	Carson River	December 1962	Multipurpose.
Chester	Plumas County	1964 or later	
Chico Creek	Sacramento River	April 1960	Channel.
Coon Creek Stream Group	Sutter, Placer, and Sacramento Counties.	After 1964	
Hidden Reservoir	Fresno County	July 1959 submitted	Reservoir.
Jack and Simmerly Slough	Feather and Yuba Rivers	After 1964	
Los Banos Creek	San Joaquin River and tributaries.	1964 or later	
Marsh and Kellogg Creeks	Contra Costa County	After 1964	
Merced County stream group	Merced County	do	
Merced River	do	June 1961	Do.
Mokelumne and Cosumnes Rivers	San Joaquin River and tributaries.	June 1962	Do.
Mormon Slough	Stockton diversion canal	do	Channel.
Oroville Dam	Feather River	January 1960	Multipurpose.
Poso, Deer Creeks and White River stream group.	Kern River	After 1964	
Red Bank and Fancher Creeks	Fresno, California	1963	
Sacramento River and Butte Basin	Iron Canyon	After 1964	Do.
Sacramento River bank protection	Sacramento River	June 1959 submitted	Bank protection, maintenance.
Sacramento and San Joaquin River (Delta).	do	1964	Channel.
Shanghai and Starr Bends	Feather River	1963	
Truckee River (comprehensive)	California and Nevada	do	Multipurpose.
Walker River	do	1964	Do.
Walnut Creek	Contra Costa County	December 1959	Channel.
SAN FRANCISCO DISTRICT			
Alameda Creek	Alameda County	do	Do.
Alhambra Creek	Contra Costa County	1962	Do.
Carmel River and tributaries	Monterey County	After 1964	Do.
Corte Madera Creek	Marin County	June 1961	Do.
Eel River	Humboldt County	1963	Do.
Eskoot (East Koot) Creek	Marin County	June 1961	Do.
Guadalupe River and adjacent streams.	Santa Clara County	1963	Do.
Klamath River	Oregon and California	After 1964	
Mad River	Humboldt County	1964	Multipurpose.
Napa River	Napa	After 1964	
Novato Creek and Tributaries	Marin County	1964	Channel.

Flood control studies in California—Continued

Name of report	Location	Completion date	Type of improvement
SAN FRANCISCO DISTRICT—continued			
Pajaro River	Santa Cruz County	1963	Reservoir.
Pescadero Creek	San Mateo	After 1964	
Petaluma Creek	Sonoma County	do	
Pinole Creek	Contra Costa County	June 1961	Channel.
Redwood Creek	Humboldt County	June 1960	Do.
Redwood Creek	San Mateo County	After 1964	
Rodeo Creek	Contra Costa County	June 1961	Do.
Russian River Basin	Mendocino County	1963	
San Francisquito Creek	San Mateo and Santa Clara Counties.	December 1959	Do.
San Gregorio Creek and Tributaries.	San Mateo	After 1964	
San Lorenzo River	Alameda County	do	
Smith River	Del Norte County	do	
Sonoma Creek	Sonoma County	1963	Do.
Soquel Creek	Santa Cruz County	June 1962	
Burlingame Streams and Vicinity	Burlingame, Calif	After 1964	
San Mateo Streams and Vicinity	San Mateo, Calif	do	
South San Francisco Streams	San Francisco County	do	

Flood control projects in California

Project	Description	Completion date	Effect on water resources			
			Flood control		Conservation (acre-feet of new water)	Power (capacity, kilowatt)
			Storage capacity (acre-feet)	Area protected (acres)		
COMPLETED						
American River levee	Levee: 8 miles, average height 8 feet. Bank protection: 7,000 linear feet. Pumping plants: 2 at 800 cubic feet per second and 300 cubic feet per second.	November 1958		2,000		
Big Dry Creek Reservoir	Rolled earthfill dam 20,000 feet long, 40 feet high, spillway, 2 dikes and 2 diversion channels.	February 1948	[1] 16,250			
Cherry Valley Reservoir	Earth and rockfill dam 2,500 feet long, 315 feet high, spillway, flood control and irrigation outlets. Constructed by local interests. Federal contribution toward first cost in amount commensurate with flood control benefits attained.	December 1955	[2] 80,000			
Farmington Reservoir	Rolled earthfill dam 7,800 feet long, 58 feet high, spillway, 2 flood control outlets, diversion channel, 3 dikes and about 23 miles channel improvement (snagging and clearing).	Dam June 1951; diversion November 1951; channel improvement, April 1955.	52,000			
Folsom Reservoir	Concrete dam 1,400 feet long, 340 feet high, spillway with 8 tainter type gates, 8 flood control outlets, 3 hydroelectric power outlets, wing dams, auxiliary dam, and 8 dikes.	December 1955	[3] 1,000,000		500,000	[4] 162,000
Isabella Reservoir	Earthfill dam 1,725 feet long, 185 feet high, ungated spillway, 1 flood control outlet, and auxiliary dam with 1 outlet conduit.	April 1953	[1] 570,000		93,100	
Merced County stream group:						
Bear Reservoir	Rolled earthfill dam 1,830 feet long, 92 feet high ungated concrete gravity weir type spillway, auxiliary dam, and 1 ungated flood control outlet.	December 1954	7,700			
Burns Reservoir	Rolled earthfill dam 4,074 feet long, 53 feet high ungated concrete gravity weir type spillway, auxiliary dike, 2 flood control outlets.	January 1950	[1] 7,000			
Mariposa Reservoir	Rolled earthfill dam 1,330 feet long, 88 feet high, ungated concrete gravity weir type spillway, auxiliary dike, and 1 flood control outlet.	November 1948	[1] 15,000			
Owens Reservoir	Rolled earthfill dam 790 feet long, 75 feet high, ungated concrete gravity weir type spillway, auxiliary dike, and 1 flood control outlet.	October 1949	[1] 3,600			
Black Rascal Creek channel	Diversion canal 1.3 miles long, 3,000 cubic feet per second capacity.	April 1956				
Owens Creek channel	Diversion canal 1.6 miles long, 400 cubic feet per second capacity.	do				

See footnotes at end of table.

Flood control projects in California—Continued

Project	Description	Completion date	Effect on water resources			
			Flood control		Conservation (acre-feet of new water)	Power (capacity, kilowatt)
			Storage capacity (acre-feet)	Area protected (acres)		
Eel River (Sandy Prairie)	Levee	October 1959		650		
Pajaro River	Levees	January 1949		5,500		
San Lorenzo River	Channel improvements	October 1959		540		
Whittier Narrows Reservoir	Earthfill dam 14,960 feet long, 56 feet high with gated outlets.	June 1957	36,160		1,000	
Ventura River Levee	2.64 miles grouted levee	December 1958		2,100		
Riverside Levees	4.99 miles stone faced levees	December 1956		3,940		
Lytle and Cajon Creeks	Collecting levees (groins) and concrete channel	December 1948		25,000		
Prado Reservoir	Earthfill dam 2,280 feet long, 106 feet high, with gated outlet.	May 1941	223,000			
Brea Reservoir	Earthfill dam 1,765 feet long, 87 feet high, with gated outlet.	May 1942	4,100			
Fullerton Reservoir	Earthfill dam 575 feet long, 47 feet high, with gated outlet.	May 1941	743			
San Antonio Reservoir	Earthfill dam, 3,850 feet long, 160 feet high with gated outlet.	October 1956	9,280			
San Diego River	Leveed channel 800 feet wide, 16,000 feet long	June 1956		1,270		
UNDER CONSTRUCTION						
Black Butte Reservoir	Rolled earthfill dam 2,970 feet long, 140 feet high, ungated weir-type spillway, 6 dikes, 1 flood control and irrigation outlet, and 2 irrigation outlets.	June 1963	[5] 160,000		56,800	
Lower San Joaquin River and tributaries.	100 miles levees, average height 12 feet, minor channel clearing, 7 spur dikes, and 13 miles of bank protection.	December 1964		140,000		
Middle Creek	14 miles levees, average height 7 feet, 5,000 feet of bank protection, 1 pumping plant, 140 cubic feet per second capacity, diversion channel, and diversion structure.	December 1959		4,000		
Pine Flat Reservoir and Kings River channel.	Concrete gravity dam, 1,820 feet long, 429 feet high, spillway with 6 taintor-type gates, 10 flood control and irrigation outlets, 3 hydroelectric power outlets (for future use), and 35 miles of levee rehabilitation, and 55 miles of intermittent channel clearing.	June 1962	[6] 1,000,000		385,000	
Sacramento River and major and minor tributaries.	335 miles levees, average height 12 feet, 265 miles of channel improvement, 3 diversion structures, extension of 1 weir, and construction of 1 weir.	After fiscal year 1966		112,000		
Success Reservoir	Rolled earthfill dam, 3,490 feet long, 142 feet high, ungated weir-type spillway, 1 flood control and irrigation outlet, and 1 irrigation outlet.	June 1961	[6] 80,000		28,500	
Terminus Reservoir	Rolled earthfill dam, 2,375 feet long, 250 feet high, uncontrolled notched weir spillway, 1 flood control and irrigation outlet, and 1 irrigation outlet.	June 1962	[6] 150,000		54,700	

Terminus Reservoir	Rolled earthfill dam, 2,375 feet long, 250 feet high, uncontrolled notched weir spillway, 1 flood control and irrigation outlet, and 1 irrigation outlet.	June 1962	[6] 150,000		54,700	
Russian River Basin	Earthfill dam, 3,560 feet long, 160 feet high, fixed crest spillway, gated outlet works and bank stabilization downstream from dam.	December 1963	[1] 48,000		60,000	
San Lorenzo Creek	1.4 miles of levees, 3.9 miles concrete channel and 2 miles of bank stabilization.	December 1961		4,500		
Carbon Canyon Dam and channel	Earthfill dam, 2,610 feet long, 99 feet high with gated outlet and 4,080 feet of downstream concrete channel.	May 1960	7,370			
San Antonio and Chino Creeks	10.2 miles rectangular concrete channel and 5.2 miles trapezoidal channel with grouted stone paving.	December 1960		57,000		
Devil, East Twin, Warm and Lytle Creeks.	12.25 miles of concrete channel and diversion levees.	December 1961		35,300		
Santa Clara levees	4.7 miles of levee with stone facing	December 1960		46,000		
Santa Maria levees	17 miles of left bank levee, 5 miles of right bank levee and 1.9 miles of leveed channel.	....do		32,400		
Los Angeles County drainage area	4 completed earthfill dams, 92.6 miles of main channel and 180.2 miles of tributary channels.	Fiscal year 1967	84,050	265,000		
Sacramento River flood control project	980 miles of levees, average height 15 feet, 5 overflow weirs, 4 bypasses, 2 river cutoffs, 15 miles of channel enlargement, and 3 pumping plants.	June 1964		800,000		
AUTHORIZED—NOT STARTED						
New Don Pedro Reservoir	Minimum capacity reservoir of 1,200,000 acre-feet to be constructed by local interests. Federal contribution toward 1st cost commensurate with flood control benefits to be attained.	Unknown	[7]		[8]	
New Hogan Reservoir	Rolled earthfill dam 1,960 feet long, 200 feet high, spillway with 3 taintor gates; 4 dikes; 4 flood control and irrigation outlets and 4 irrigation outlets.	June 1964	[9] 325,000		74,300	
New Melones Reservoir	Concrete gravity dam 1,090 feet long, 473 feet high, spillway-gated ogee overflow section of dam.	Not scheduled	[10] 1,100,000		175,000	[11] 84,000
Hodges Reservoir	Concrete gravity dam 970 feet long (to be constructed, owned and operated by local interests with Federal contribution for flood control reservation).	Unknown	85,000		[12] 280,000	
Stewart Canyon Debris Basin and Channel.	Debris basin 610 feet long. Concrete channel 0.84 mile long.	Fiscal year 1963		310		
Mill Creek Levee	2.36 miles of grouted levee	October 1960		5,600		
San Jacinto River and Bautista Creek	7.27 miles of grouted levee	November 1961		13,500		
Oroville Reservoir	Construction by local interests; Federal contribution toward 1st cost to be commensurate with flood control benefits to be attained, which amount is to be determined by studies currently underway.	Schedule unknown	[13] 3,500,000		[14]	[14]
Sacramento River, Chico Landing to Red Bluff.	Bank protection work and incidental clearing and snagging, subject to condition that only such work be constructed as is found economically justified at time of construction.	Not scheduled		[15]		

[1] All flood control.
[2] For flood control.
[3] 400,000 maximum for flood control.
[4] Constructed by USBR.
[5] 150,000 for flood control.
[6] All usable for flood control.
[7] Not established; to be at least 340,000 acre-feet for flood control.
[8] Not available.
[9] 165,000 acre-feet for flood control.
[10] 450,000 acre-feet for flood control.
[11] Recommended; not authorized.
[12] City of San Diego water supply.
[13] 750,000 acre-feet; maximum for flood control.
[14] To be constructed by State.
[15] Erosion prevention (40 acres).

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SECTION X: COORDINATION WITH OTHER FEDERAL AGENCIES

1–141. Basic requirements

a. General requirements.—Coordination is a basic and essential part of the civil works mission, and it must be given the time and effort necessary at all levels of investigation to its successful accomplishment. Coordination with other Federal agencies concerned with water resource development is necessary in varying degrees to insure that all pertinent facts on the objectives, responsibilities, and plans of other agencies have been considered in the formulation of projects recommended to Congress by the Chief of Engineers. This policy, of long standing, is in accord with the report, dated December 22, 1955, by the President's Advisory Committee on Water Resources Policy, which recommends ". . . 2. Planning. That planning for water resources and related developments be conducted on a cooperative basis with representatives of all Federal, State, and local agencies involved; and that this joint participation be continuous from the beginning in order that plans and projects developed assure the best and most effective use and control of water to meet both the current and long-range needs of the people of a region, State, or locality, and of the Nation as a whole . . ." The basic purposes of coordination of preauthorization planning are to obtain and interchange information pertinent to the objective of sound project formulation, to insure balanced development among the plans of the various agencies, and to discuss and review proposed plans and reports. Initiation of coordination of investigations is the responsibility of the reporting officers and will be the subject of a special letter, in addition to the usual public notices, advising other agencies of the start of the study. (See par. 1–142c.) Proper, early, and continuing coordination at the District or regional level will insure rapid and satisfactory review at Department headquarters level. Coordination of Corps' studies with other agencies is closely related to the coordination activities in which the Corps participates upon request in the development of water resource programs and projects by other Federal agencies.

b. Legislative, Executive, and Interagency requirements.—Acts of Congress, Executive Orders, and Interagency agreements calling for coordination with other interested Federal agencies and affected States under the surveys program include the following:

(1) Section 1(a) of Flood Control Act of December 22, 1944 (Public Law 534, 78th Cong.).

(2) Section 1(a) of Rivers and Harbors Act of March 2, 1945 (Public Law 14, 79th Cong.).

(3) Act approved July 29, 1946 (Public Law 562, 79th Cong.). (Relative to bridges across dams).

(4) Act approved August 14, 1946 (Public Law 732, 79th Cong.) (relative to fish and wildlife, see also items (11) and (12) below), as amended by Public Law 624, 85th Congress, approved August 12, 1958.

(5) Watershed Protection and Flood Prevention Act of August 4, 1954 (Public Law 566, 83d Cong.), as amended by Public Law 1018, 84th Congress, approved August 7, 1956.

(6) Executive Order No. 9384 of October 4, 1943 (relative to coordination with Bureau of the Budget).

(7) Executive Order No. 10,584 of December 18, 1954 (relative to Public Law 566, 83d Cong.).

(8) Bureau of the Budget Circular No. A–47, December 31, 1952.

(9) Agreement on Cost-Allocation among Departments of the Army and the Interior, and the Federal Power Commission, March 12, 1954.

(10) Inter-agency Agreement on Coordination of Water and Related Land Resources Activities, approved by the President on May 26, 1954. (See *manual on "Policies and Procedures for Distribution and Coordination of* Reports by Agencies Represented on the Inter-Agency Committee on Water Resources," revised July 1958.)

(11) Agreement between the Fish and Wildlife Service and the Corps of Engineers, August 20, 1954.

(12) Procedures for Developing General Plans for Fish and Wildlife Management approved March 9, 1955, by Director, Fish and Wildlife Service and April 6, 1955 by Chief of Enginers.

(13) Report of the Presidential Advisory Committee on Water Resources Policy, December 22, 1955 (PACWRP).

(14) Agreement between the Department of the Army and the Department of Health, Education and Welfare on the basis for assistance by the Public Health Service on water supply matters, November 4, 1958.

1–142. Inter-Agency agreements

a. Agreement of Inter-Agency Committee on Water Resources.—On 26 May 1954, the President approved establishment of the Inter-Agency Committee on Water Resources (ICWR). Paragraph 4(b) of the agreement approved by the President is especially pertinent to cordination in the surveys program. That paragraph reads as follows:

"Continuing procedures would be established to coordinate agency activities in the investigation and planning of water and related land resources projects and programs, beginning at the earliest stages of investigations at field level. Included would be coordinated programming and scheduling of investigations, interchange of basic data and information during the planning process, exchange of planning reports first at field level and finally at Washington level. Included also would be a means for reconciling differences among agencies before planning reports are submitted in final form to the President and the Congress. For this latter purpose, a special subcommittee of the main Committee would be established should it be required for the particular case."

b. Membership of Committee.—The present membership of ICWR includes the Departments of Agriculture, Army, Health, Education and Welfare, and Interior, and the Federal Power Commission as full members, and the Departments of Commerce and Labor as associate members.

c. Coordination procedures of the Corps of Engineers.—Coordination must have the objectives of consideration of all related aspects, needs, and objectives of comprehensive water resource planning and of the views of other agencies concerned in or responsible for such aspects, as well as the provision of adequate time to such agencies to furnish comments and assistance on the general and specific problems involved. The following procedures of coordination are prescribed, and require that the problem of coordination be approached with a mutual desire to work together, achieve understanding, and reconcile differences. These procedures shall be followed in all investigations, including navigation and beach erosion control as well as river-basin development, that affect or are affected by water resource uses of inter-agency interest.

(1) Coordination of preauthorization reports by Federal agencies will be accomplished at regional level insofar as practicable. Early and continuing coordination is an essential responsibility of reporting officers.

(2) *Requirements of coordination.*—The following minimum requirements of coordination at regional level are prescribed:

(a) *Initiation of coordination.*—When a Division or District Engineer is assigned responsibility for a report on a project or improvement, he will, upon initiation of the investigation, write special letters, in addition to routine notices, to the corresponding regional offices of the other departments and agencies. The letters will advise the other agencies of the initiation of studies, of known problems, and of the desire of the Corps for their comments and any specific assistance that they can provide. The letters will request a reply from the other agencies within a specified period as to what interests they may have in the problem area, the general needs and objectives affected, and the specific problems affecting or affected by the projects or improvements under study, together with any additional data they may make available or comments they may care to make. A followup will be made within a reasonable time if no response is received.

(b) *Continuing coordination.*—The contacts and liaison thus established by (a), above, will be continued throughout the investigation, until such time as the agency involved makes a recommendation or states by letter that it has no further interest in the investigation at that time. As the plan which is to be incorporated in the report is being formulated, the District Engineer responsible for the report will, from time to time, contact and arrange for conferences with the corresponding regional offices of other departments or agencies, in order to determine what pertinent data are in existence, to arrange for the interchange of such data, to arrange schedules for obtaining additional data without duplication, to interchange information, and to discuss the plan and report. Data and comments thus obtained will be carefully reviewed to control the course and costs of further necessary study. The data, conclusions and recommendations made by other agencies

shall be adopted by the reporting officers insofar as consistent and practicable, but it is his responsibility either to accept or reject as he sees fit, with a view to reaching sound and justifiable conclusions and recommendations. These matters will be adequately discussed and documented in his report or in accompanying correspondence.

(c) When the report of the District Engineer responsible therefor has been completed, and prior to transmission to higher authority, it will be submitted to other regional offices that have indicated their interest for written comments within a specified period. Such comments will usually become an appendix to the report.

(d) Whenever questions of coordination remain unsettled after all practicable measures at field level have been utilized, reporting officers will advise the Chief of Engineers promptly.

(3) The following types of preauthorization reports will be referred by the Chief of Engineers to the heads of other Departments or agencies in Washington, D.C.:

(a) Preauthorization reports required to be submitted to other Departments or agencies in accordance with existing law;

(b) Preauthorization reports upon which there is either lack of agreement at regional level or in which the regional officers have expressed specific interest;

(c) Preauthorization reports upon which there has been agreement at regional level, but which are substantially changed in Washington, D.C., after their receipt from the originating regional office.

1–143. Agreements with fish and wildlife service

The agreements of 20 August 1954 on planning and 6 April 1955 on General Plans for Fish and Wildlife Management on project lands, are designed to cover the application of the Coordination Act of 14 August 1946 (Public Law 732, 79th Cong.) to river basin studies and projects of the Corps of Engineers. The general principles of these agreements will also be followed insofar as applicable in coordinating fish and wildlife matters with the State agencies concerned. The Chief of Engineers will be kept informed of any unusual problems of coordination under these agreements. A specific statement on coordination with the Fish and Wildlife Service, and the results thereof, will be included in the District Engineer's report. The minimum provisions of par. 1–142c(2) will be supplemented by the following:

a. Provisions of agreement.—In accordance with the agreements of 20 August 1954, for the purpose of implementing Public Law 732, 79th Congress, approved 14 August 1946, investigations and reports will observe the following elements of coordination:

(1) The reports and recommendations of the Fish and Wildlife Service shall be as specific as practicable as to purpose, lands to be utilized or acquired, costs, and results expected, including both gains and losses to fish and wildlife (including sport fishing), and insofar as feasible shall be presented to the public and to State agencies for coordination;

(2) Joint hearings will be held as necessary;

(3) Costs of carrying out Fish and Wildlife Service recommendations will be estimated by the Corps, except for separable features;

(4) The District Engineer, in his subject report, will include:

(a) The substance of the Fish and Wildlife Service report (with the full text in an appendix);

(b) Specific acceptance of satisfactory recommendations (including land acquisitions), or reasons for not accepting them;

(c) Recommendations for substantial remedial measures for wildlife losses only if costs will be nominal or estimates of costs are included;

(d) Conservation of fish and wildlife as a project purpose, consistent with criteria of the Bureau of the Budget, if the effects of a project thereon are significant;

(e) Only tentative opinions when any recommendations by Fish and Wildlife are not specific, subject to definite planning studies after authorization.

b. General guidance on public relations.—The successful conduct of the civil works program requires that the Corps of Engineers achieve public understanding of its work and resolve conflicts in a manner that will be in the public interest and permit satisfactory progress in the program for development of water resources. The frequency of criticisms of the civil works program that its

works are impairing programs for fish and wildlife conservation and outdoor recreation represents an area of misunderstanding and a conflict of interests that should receive prompt attention. Division Engineers, in their public relations programs, will personally give their attention to correction of the misunderstandings and to inform the public of the facts about the Corps' contribution toward the preservation and enhancement of fish, wildlife, and outdoor recreation, *with the following objectives:*

(1) To compile and place before the public the facts with respect to the Corps' contributions, both present and planned, to the preservation and enhancement of fish, wildlife, and outdoor recreational resources, and the facts with respect to the Corps' objectives, policies, legal authority, limitations and problems related thereto.

(2) To provide factual answers to unwarranted attacks made upon the Corps or Corps' projects, or to questions raised concerning them.

(3) To provide groups, agencies or individuals with information useful both for answering criticism and in presenting to the public positive accounts of the Corps' position and accomplishments.

(4) To furnish explanations of the Corps' position, in cases of honest differences growing out of the planning, construction or operation of projects; and particularly to give advance notice and explanations to interests directly concerned, in areas where fish, wildlife or outdoor recreational interests may be adversely affected as a result of project operating problems beyond the Corps' control.

(5) To improve the operation of projects, wherever possible and consistent with authorized functions, with respect to their bearing upon fish, wildlife and outdoor recreational resources.

(6) To maintain liaison with interests engaged in the furtherance of fish, wildlife and outdoor recreational resources, and to encourage understanding and cooperation between these interests and the interests cooperating with the Corps in furtherance of the flood control, navigation and other aspects of civil works projects.

1–144. Agreement with Department of Interior and Federal Power Commission on cost allocation

The agreement among the Departments of Army and Interior and the Federal Power Commission, dated 12 March 1954 and entitled "Cost Allocation," has special application to the standards and procedures to be used in allocating costs of multiple-purpose projects, and in determining reimbursement or sale rates. Application in reports or final cost allocation studies is discussed in Chapter 9 of Part CI, and Part CII of this Manual. The Separable Costs-Remaining Benefits Method of Cost Allocation was adopted for all multiple-purpose projects, except municipal and industrial water supply when power is not involved for which the Corps prefers the use of facilities method (pro rata storage).

1–145. Memorandum of understanding with Soil Conservation Service on drainage activities

A memorandum between the Soil Conservation Service and the Corps of Engineers, dated 1 June 1948, outlined "* * * the basic procedures which the Soil Conservation Service and the Corps of Engineers have found to be in the public interest to effectuate the fullest cooperation in the performance of their respective responsibilities for drainage activities." The procedures therein are supplementary to the minimum procedures for coordination prescribed in subparagraph 1–142c.(2) in investigations involving major drainage problems.

1–146. Direct assistance by other Federal agencies

Consideration will be given in the course of all investigations to the possibility and advisability of utilization of the services of other Federal agences concerned with water resources and related problems, and the utilization of any unpublished or published information prepared by such agencies. Under Section 601 of the Economy Act (31 U.S.C. 686), orders may be placed with other departments or agencies of the Government for material, supplies, equipment, work, or services on a reimbursement basis. Additional information on specific problems for which direct assistance may be requested is given under subsequent paragraphs on the individual agencies. Reporting officers will confer directly with the field representatives of other agencies, and through the Chief of Engineers when correspondence or conferences with the heads of other Federal agencies are necessary.

1–147. Nature of coordination with individual Federal agencies

The benefits of coordination will be obtained most effectively through vigorous field action during the time that plans are being formulated, in order to keep at a minimum those matters that will require resolution in headquarters offices. Reporting officers will arrange for coordination at the earliest possible time during investigations, so that cooperative efforts may be scheduled with a view to minimum delay of the Corps program. (See par. 1–146.) Revision of the booklet entitled "Policies and Procedures for Distribution and Coordination of Reports by Agencies Represented on the Inter-Agency Water Resources Committee," prepared by the Federal Inter-Agency River Basin Committee, April 1951, is now underway by the Inter-Agency Committee on Water Resources (ICWR). The revised booklet will define the interests and services of Federal agencies in the water resources field. Pending issuance of the revised paper, the following paragraphs provide interim guidance. Paragraph 1–139d.(2) lists the agency heads for coordination purposes.

1–148. The Department of Agriculture

The Department of Agriculture will be consulted during investigations that affect cultivated, range, and brush-covered wild lands, or forest land, or that consider flood prevention, or the conservation, development, utilization or disposal of water, thereby affecting farming, ranching, or forestry, and the production, processing and marketing of crops thereby. The Department is also interested in any investigations or projects affecting use of lands administered by it, or affecting the production, distribution and marketing of electric energy in rural areas.

a. Field coordination.—Principal field coordination will be with regional representatives of the agencies listed in par. 1–139d.(2). Specific material that may be available includes basin flood control reports and supporting data developed under 1936 Flood Control Act authority, reports and supporting data related to the Small Watershed Protection Program and Public Law 566 activities, data on agricultural flood damages and land capabilities, aerial photographs, and detailed information on land use. Direct assistance may be requested on specific problems, such as evaluation of agricultural benefits creditable to flood control projects, determination of on-farm and minor drainage measures required in connection with major drainage projects, and measurement of any adverse effects of projects on crop production. Early consultation will prevent unnecessary duplication of effort in assembly of basic data necessary for analysis of Corp projects and will contribute to coordination of Corps and Agriculture programs.

b. Coordination of Corps studies under Public Law 566, 83d Congress.—Section 4 of Executive Order No. 10,584, 18 December 1954, implementing Public Law 566, 83d Congress (Watershed Protection Act), requires the Secretary of the Army to notify the Secretaries of Agriculture and Interior and other Federal agencies in writing of the intention to initiate surveys or field investigations involving water resource development works, and also to furnish the Federal agencies concerned appropriate information on the scope, nature, status and results of each survey or investigation. Coordination will be initiated generally when funds for the study become available and work can be started. Basic information will be submitted to the Chief of Engineers at appropriate times for preparation of letters of comment from the Secretary of the Army to other agencies. Section 5b of the Order further develops the general responsibilities of all Federal agencies involved in comprehensive development of water resources, and in coordinating upstream and downstream works. Attainment of these objectives requires that plans be coordinated to the maximum extent possible in the field. However, the assistance or advice of the Office, Chief of Engineers, should be requested promptly when needed.

1–149. Department of Commerce

a. The Bureau of Public Roads.—The Bureau of Public Roads will be consulted on the effect of Corps projects or proposals on highway systems, bridges across dams, economics of highway and highway bridge modifications, and problems involving Federal-aid roads and State highways, in carrying out the provision of the Act of 29 July 1946 (Public Law 562, 79th Cong.), and similar matters. See Appendix C of this chapter for policy and procedure of the Bureau on this matter. Specific material that may be available includes data on highway needs and programs, traffic counts, and costs. Bureau of Public Roads representation at all public hearings on investigations may be anticipated, and

early liaison and consultation with the appropriate District Engineers of the Bureau is desirable so that mutual problems may be resolved at field level to the maximum practicable extent. Minimum procedures supplemental to those prescribed in subparagraph 1–142c follow:

(1) *Road relocations resulting from water projects.*—By Policy and Procedure Memorandum 50–40.2, subject: Highway-Water Resources Developments, the Bureau of Public Roads defined its policy, procedures, viewpoint and requirements. A copy of this memorandum is attached as Appendix C.

(2) *Highway crossings on locks and dams.*—In connection with favorable reports proposing a lock or dam, the District Engineer will conduct sufficient investigations and prepare such general layout plans as may be necessary to determine tentatively the structural feasibility and increased cost of providing a highway crossing. Such drawings showing the highway crossing as a part of the dam structure will be retained in the District Office and will not be submitted with the report to higher authority. The report, under the paragraph heading "Discussion," will includes reference to Public Law 562, will state whether provision for a highway crossing, if later certified to be needed, would be structurally feasible and would not interfere with the proper functioning and operation of the dam, and will give a brief statement of the estimated increased cost involved. Comments of the local Public Roads District Engineer and State highway officials will be included under the paragraph heading "Coordination." In connection with the coordination of the report with these highway authorities, they should be informed that if the proposed project is authorized by Congress, provision for a highway crossing if later certified as needed in accordance with the terms of the act, can be considered in detail in connection with the preparation of the definite project report and the plans and specifications. It should also be suggested that they give such continuing study as they deem desirable in connection with their long-range highway planning to the need for a highway crossing at the prospective dam site in order to minimize delays in subsequent detail planning.

(3) *Navigational clearances.*—Careful consideration will be given to applicability of the principles and procedures in the following papers that have been circulated to the field:

(a) "Navigational Clearance Requirements for Highway and Railway Bridges," by the Bureau of Public Roads, February 1955.

(b) "Economic Analysis, Lyndale Avenue Bridge, Minnesota River, Minnesota," by Corps of Engineers, April 1955.

b. The Coast and Geodetic Survey.—The Coast and Geodetic Survey will be consulted for basic survey and geodetic control data, tide and current information, nautical and aeronautical maps, and related information. Reports will indicate the nature of coordination achieved, and the status of and the need for additional geodetic control in the area. Field coordination during preauthorization studies will expedite later departmental review of reports. For the present, reporting officers will send notices to and will coordinate their reports directly with the Director of the Coast and Geodetic Survey in Washington, D.C.

c. The Census Bureau.—The Census Bureau will be consulted for basic data on population, industry, industrial water use, and similar background information on the economic development of areas under investigation.

d. The Weather Bureau.—The Weather Bureau will be consulted for basic meteorologic data pertinent to specific investigations. Direct assistance may be requested on problems involving development of project storms, transposition of storms, and similar matters. Corps' participation in the cost of the hydroclimatic network and hydrometeorological studies provides a basis for assembly of basic data applicable to the overall program of water resource development and design of specific projects.

e. The Office of Field Services.—The Office of Field Services is responsible for disseminating Department of Commerce reports, data, and statistical information of interest to industry and business and for making available the facilities and services of the Department. Regional Directors should be consulted in regard to assembly of necessary basic data on the economic development and potential of areas under investigation.

f. The Civil Aeronautics Administration.—The Civil Aeronautics Administration will be consulted when considered Corps projects will affect airports or airway installations.

1–150. The Department of the Interior

Responsibilities of the Department of the Interior in water resource development are similar to those of the Corps of Engineers. Agencies of the Department will be consulted as early as practicable during investigations to prevent duplication of effort and to eliminate program conflicts.

a. Regional Field Committees.—Five Regional Field Committees of the Department provide for coordination among the bureaus and services and with other agencies. Each committee consists of a representative from each bureau in the area.

b. Bureau of Reclamation.—The Bureau of Reclamation will be consulted on availability of basic data and information on water resource projects and programs in the 17 States west of the 98th meridian, and in Alaska and Hawaii.

c. Fish and Wildlife Service.—The Fish and Wildlife Service will be consulted on development of general plans for fish and wildlife management, prevention of loss of and damage to wildlife resources from water resource projects, information on fish resources related to development of fishing harbors, evaluation of fish and wildlife and related recreation benefits, and similar matters. See par. 1–143 on agreements with the Service.

d. National Park Service.—The National Park Service will be consulted on the effect of corps projects on national parks, archeological and historical values, possibilities, plans and estimates of costs for recreational facilities of projects under study, and evaluation of recreation benefits. Interpreting "recreation" broadly to include areas of archeological, historic, scenic and scientific interest, the Park Service:

(1) Investigates the recreation resources, potentialities, and needs of river basins, including water-control projects;

(2) Reports findings and makes recommendations for the conservation and development of recreation resources;

(3) Prepares plans and estimates of cost for construction of recreation facilities at water-control projects;

(4) Supervises the construction of recreation facilities at Federal reservoir projects;

(5) Arranges for administration by State or local governmental agencies of reservoir recreation areas when they are appraised as being of less than national significance.

e. Bureau of Mines.—The Bureau of Mines will be consulted on assembly of basic data on mineral resources and information and assistance on water resources problems affecting such resources. The Bureau of Mines is interested in the effect of proposed construction on the mineral industry, and on the effect of mineral industry on proposed construction, including:

(1) Use of water for power, flood regulation, irrigation, municipal, and industrial uses;

(2) Availability of large blocks of low-cost power for development of mineral-processing industries;

(3) Changes in demand for minerals caused by construction;

(4) Inundation of mineral resources;

(5) Percolation of reservoir water into mine workings;

(6) Possible flooding of mine workings;

(7) Improved transportation facilities as a result of flood regulation (principal inland waterway tonnage is mineral);

(8) Pollution (studies of mineral wastes at their source);

(9) Increased fuel requirements for steam-power plant tie-ins to hydro projects;

(10) New mineral developments made possible by water and power construction.

f. Bureau of Indian Affairs.—The Bureau of Indian Affairs will be consulted for determination of the effects of Corps projects on Indian lands and affairs, including those developments that may affect the economic status of the Indian in the area or region, particularly as they relate to the following:

(1) Lumber production and commercial fishing in the Pacific Northwest and Alaska;

(2) Irrigation agriculture in the majority of the Western States;

(3) Power production, use and sale in Montana, Washington, and Arizona;

(4) Mining of both metallic and nonmetallic substances in all States having Indian lands;

(5) Livestock production throughout the West;

(6) Commercial recreation development in many Indian areas.

g. Bureau of Land Management.—The Bureau of Land Management will be consulted for information on public domain under the jurisdiction of the Bureau, effects of projects thereon, and requirements for cadastral surveys.

h. Power marketing agencies.—The Bureau of Reclamation, the Bonneville Power Administration, the Southwestern Power Administration, and the Southeastern Power Administration, in their respective areas, will be consulted on marketing of surplus electric power generated at Corps projects.

i. U.S. Geological Survey.—The U.S. Geological Survey will be consulted for basic mineral, hydrologic and topographic data. Direct assistance may be requested on stream-flow measurement problems pertinent to specific investigations. The cooperative stream gaging program of the Survey and the Corps provides basic data applicable to the overall program of water-resources development. Valuable data are frequently available from the Survey on the mineral and water resources of Federal, Indian and other lands, construction materials and other resources, geologic suitability of dam sites, geologic and topographic surveys and maps, and the occurrence, movement, quantity, quality, availability and utilization of surface and ground waters.

j. Governors of Territories and Island possessions.—The Governors of Territories and Island possessions will be consulted in regard to investigations of areas under their jurisdiction. The Office of Territories assists the Secretary in guiding and coordinating operating programs of varying kinds for the economic and political development, and provides advice and information on the conditions and needs of the Territories of Alaska and Hawaii, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands and other islands in the Central Pacific, and also directs the operations of the Alaskan Railroad, the Alaskan Road Commission and the Alaska public works program.

1–151. Department of Health, Education, and Welfare

The Public Health Service of the Department of Health, Education, and Welfare will be consulted on water supply needs and quality, stream pollution, mosquito control, and related problems. Direct assistance may be requested on economic evaluation of the water supply and low flow regulation functions of Corps projects, their possible beneficial or adverse effects on stream qualify, and similar matters. General basin studies of pollution abatement requirements have been made by the Service and should be consulted.

1–152. The Department of Labor

The Department of Labor will be consulted in matters pertaining to wage rates, labor sources, etc., affecting estimates of costs. The Department also is interested in the effect of Federal projects on employment and on area development.

1–153. The Federal Power Commission

The Federal Power Commission will be consulted on the hydroelectric power possibilities of Corps projects, and on any reports affecting the regimen of rivers. Cooperation may be obtained in the assembly and development of basic data required for project formulation and economic analysis, including power-market studies, unit-cost data, cost allocations, determination of power values and rates, etc. Definite statements are required in Corps reports concerning power possibilities and the recommendations of the Federal Power Commission for provisions for future power installations at proposed Corps projects. See Part CXVII, Chapters 1, 2, and 3 of this Manual for additional information on coordination with the Commission.

1–154. Other Federal agencies

Within the areas of their responsibilities, coordination may be necessary with the following agencies:

a. U.S. Coast Guard.—The U.S. Coast Guard, an agency of the Department of the Treasury, will be consulted on navigation hazards, oil pollution, navigation aids, small craft registration, etc.

b. Tennessee Valley Authority.—The Tennessee Valley Authority will be consulted on coordination of the TVA and Corps programs. Ordinarily, Corps reports on area in the Tennessee River Basin are referred to TVA for comment at field level, under the general procedures prescribed in par. 1–142c.

1–155. Other agencies of the Department of Defense

Coordination will be maintained with the Departments of the Navy and Air Force and with other agencies of the Department of the Army to the extent necessary to insure recognition of their interests in the planning of water resource improvements. Such matters as the requirements of military navigation, protection of military installations against flood damage, water supply requirements for defense installations, and utilization of lands under the jurisdiction of the Department of Defense may be involved.

1–156. International Joint Commission, United States and Canada

By means of a Treaty dated January 11, 1909, known as the Boundary Waters Treaty (36 Stat. 2448), the United States and Canada set up procedures for handling matters of mutual interest along their common frontier. These procedures may be grouped into two types insofar as they are related to activities of the Chief of Engineers: first, approval by the International Joint Commission of proposals for use of boundary waters or waters crossing the boundary as a result of which the Chief of Engineer may be called upon to participate in "Boards of Control" to insure that the terms of the Commission's Order of Approval are carried out as indicated in subparagraph *a* below; and second, investigations and reports by the International Joint Commission on which the Chief of Engineers may be called upon to participate through "Engineering Boards" as indicated in subparagraph *b*, below.

a. International Boards of Control.—The 1909 Treaty requires the International Joint Commission, when approving proposals submitted to the Commission under the provisions of Articles 3 and 4 of the Treaty, to prescribe conditions to insure that the proposals will be carried out in a manner consistent with the purposes of the Treaty. Usually those conditions involve water levels and flows. The Boards of Control that the Commission creates to exercise continuing supervision over the problem will often include representation from the Corps of Engineers. The duties of the representative of the Corps of Engineers in such cases depend on the nature of the proposal and of the Commission's Order of Approval.

b. International Engineering Boards.—Under Article 9 of the 1909 Treaty, the International Joint Commission may be called upon by the Governments of the United States and Canada to investigate and report upon specific problems along the United States-Canadian Boundary. In such cases the Commission will usually be authorized to call upon appropriate agencies of both countries to assist in the investigation and report. This will be done by appointing representatives of the appropriate agencies to serve on Engineering Boards. These Boards will then make arrangements for accomplishment of the necessary investigations through the regular channels of the agencies concerned.

c. Initiation of International Studies.—Whenever investigations and studies being carried out by the Corps of Engineers require consideration of problems of mutual concern with Canada, consideration may be given to arranging for the Governments of United States and Canada to request the International Joint Commission to study the matter as contemplated by the 1909 Treaty. Recommendations for such arrangement will be submitted to the Chief of Engineers for necessary further action through the Deparmtent of State.

d. Funds for International Studies.—When the international study originates from the need of the Chief of Engineers for coordination with Canada, funds for the United States' share of the costs of the study will ordinarily be provided by a specific item under the Examinations and Surveys (Special Studies) category, or by a special appropriation for the purpose. When the international studies are requested by others than the Corps of Engineers, any Corps' expenses, other than nominal expenses, will usually be reimbursed from appropriations available to the International Joint Commission or other agencies having primary interest. Routine Board of Control activities are financed by an allowance under the Appropriation for General Investigations—Research and Development (International Boards of Control).

1–157. International Boundary and Water Commission, United States and Mexico

The International Boundary and Water Commission has responsibilities for certain activities and specific problems along the boundary between the United States and Mexico. The Commission has its own engineering staff, and will carry out its own surveys and studies or will arrange directly with appropriate agencies for assistance on such studies as required. Any civil works activities

of the Chief of Engineers of common interest to the United States and Mexico will be coordinated with this Commission.

1–158. Atomic Energy Commission

The interests of the Atomic Energy Commission in Corps studies will be ascertained. Such interests may include requirements of the Commission for transportation of basic commodities, provision of power in power-deficient areas, effect of flood control on installations, etc.

1–159. Coordination requests made by other agencies

a. General.—Other Federal agencies having responsibility for development of water resources projects, notably Agriculture and Interior, may originate requests for coordination similar to those originated by the Corps in connection with its planning program. Within the limitations of Corps authority and capability, such coordination will be effected to include the supplying of basic data, information on projects and programs, and expression of Corps interest, and the giving of direct assistance . The Chief of Engineers will be informed promptly of requests on the field for coordination of other than routine nature. Legislative requirements and interagency agreements will be strictly observed.

b. Small-watershed reports.—Special procedures for coordination with the Department of Agriculture on activities under the Watershed Protection and Flood Prevention Act of 4 August 1954 (PL 566, 83d Congress) are prescribed in the Act and in Executive Order No. 10,584 dated 18 December 1954. Upon receipt of watershed reports from the Department of Agriculture, the Chief of Engineers will request the comments of the District and Division Engineers, and will also supply an information copy of the report to the Board of Engineers for Rivers and Harbors. The engineering aspects of the proposed plan, and its physical and economic relation to and effect on Corps of Engineers' projects and plans will be reviewed by the Chief of Engineers, with consideration of all comments before the reply of the Secretary of the Army is sent to Agriculture.

c. Other reports.—Reports of other agencies that have been referred to the Secretary of the Army or the Chief of Engineers for comments, when further referred to Division Engineers for detailed review, will be given prompt attention in order that legislative limitations on time for review and processing may be met. Any matters of misunderstanding, lack of clarity or basic data, etc., will be noted, discussed, when practicable, with the proper originating office of the agency concerned, and advice thereon provided the Chief of Engineers.

d. Beach erosion studies for other agencies.—Requests by Federal agencies for assistance in beach erosion studies or planning of coastal works will be processed as prescribed in Section VII and VIII for cooperative studies. All costs for such studies will be borne by the requesting Federal agency. Formal application should be made through the agency's channels to the Chief of Engineers.

SECTION XI: COORDINATION WITH LOCAL INTERESTS

1–160. General

The interests and rights of the States in determining the development of the watersheds within their borders, and likewise their interests in water utilizaion and control, will be recognized in order to protect to the fullest possible extent established and potential uses for all purposes of the waters of the Nation's rivers, in accordance with the Flood Control Act of 1944 and the River and Harbor Act of 1945. (See par. 1–131.) The report by the President's Advisory Committee on Water Resources Policy (PACWRP) indicates the desirability of adequate consultation with and consideration of the interests of the States, local communities, and individuals most vitally affected (par. 1–141). Effective coordination with local interests can best be achieved when they are represented by their properly designated State or local governmental agencies. Unofficial but responsible groups of local citizens should be given proper recognition, but their lack of official or legal standing usually precludes their suitability for reaching satisfactory agreement on plans and local cooperation. In all cases, agencies and persons known to be interested in investigtions will be consulted and will be given full opportunity to express their views. Initial action along this line will usually be taken by means of a public hearing early in the course of investigation. (See Section IX of this chapter on public hearings.)

1–161. Coordination with Governors of States

The Chief of Engineers, and each Division and District Engineer will maintain a current list of the State representatives or agencies designated by Governors

as their representatives in accordance with the Flood Control Act of 1944 and the River and Harbor Act of 1945. Reporting officers will forward appropriate information to the Chief of Engineers as changes occur. Insofar as practicable or warranted, the reporting officers will insure that the various State agencies concerned with planning and development of water resources have been consulted, if they so desire, and that the State is favorable to or not opposed to proposed projects. To insure, so far as practicable, favorable comments from the affected State or States, the reporting officers will consult freely with the designated representatives of the affected States in preparation of plans and proposals for river and harbor, flood control, and multiple-purpose projects and, where applicable, with representatives of the Department of Agriculture and the Interior, in order that there may be full coordination of plans, proposals, or reports and related investigations for the development of the waters under consideration by the Chief of Engineers with plans for the construction and operation of proposed works by the affected States and the other Federal agencies. The services of all State agencies and the data and records thereof that pertain to the water resource problems under study will be secured or consulted to insure that all available useful information is considered, and that basic research is not unnecessarily repeated.

1–162. Coordination with other non-Federal interest

a. District Engineers of the Corps of Engineers are expected to be familiar with local sources of data. The existence and availability of valuable data and information will be ascertained from previous State and local engineering studies of projects and sites for water resource development. Beyond the technical data to be so obtained will be the establishment of cordial and cooperative relations that will extend through the final phases of the investigation and report review to authorization and construction stages. Among State and local organizations that have cooperated with the Federal Government in water resource investigations and developments, as well as in assisting local communities and groups in such matters, are:

Department of Public Works
Departments concerned with Water and Water Resources
Departments concerned with Lands and Forests
Conservation Commission or Departments
Conservancy Districts
Park Commissions
Flood Control Commissions or Districts
Soil Conservation Districts
Inter-State Compact Commissions
Inter-State Sanitary Commissions
Drainage and Levee Districts
Reclamation Organizations
Planning Commissions
Harbor and Port Commissions and Authorities
Chambers of Commerce

Some agencies such as the above are created by States for specific purposes; others, as parts of established State governments, assume relatively broad duties in accordance with State law.

b. When the act ordering an examination or survey does not specify the nature or the limiting points of the improvement contemplated, parties known to be interested in the proposed improvement will be consulted. The Senator or Representative responsible for the item authorizing the report will be consulted concerning the character and extent of the improvement desired, and for the purpose of obtaining the names of the parties at whose instigation the investigation was initiated. The data thus obtained relative to the scope of the desired improvement will be incorporated and discussed in the report.

c. The District Engineer's report will identify the Federal, State, and other local agencies that have been consulted. The views of such interested agencies will be briefly summarized and their written reports, if any, enclosed as appendices to the report of the District Engineer.

1–163. Local cooperation in project costs

An important objective of coordination with local interests during examinations and surveys is the determination of their willingness and ability to meet prescribed requirements of local cooperation. (See Chapter 10, Part CI of this Manual, on cooperation and cost sharing.) It should be recognized that the

principles and laws affecting subordinate governmental authorities vary from State to State and control the type of local organization possible. Also, the bonding and financing restrictions, as well as the necessity for popular referendums, materially affect the practicability of and time required for formation of cooperating agencies. The desirability of adequate local organizations should be pointed out to local interests as soon as possible in order that this factor will not delay the investigations, because at least an acceptable preliminary indication of the willingness and ability of local interests to cooperate in a proposed project is necessary to warrant a favorable recommendation.

1–164. Local cooperation in study costs

a. Contributed funds.—The Chairman of the House Committee on Appropriations has disapproved acceptance of contributed funds in any amount toward surveys, on the basis that such acceptance might be construed to commit the United States to favorable action. This prohibition does not, of course, apply to cooperative beach erosion studies.

b. Contributed data.—The above position does not extend to the following items of existing or requested data that may appropriately be supplied by local interests on a nonreimbursable basis:

(1) Maps, charts, and basic survey and engineering data and reports, even if these have been acquired or prepared by local interests for the specific purpose of the investigation.

(2) Economic data on commerce, flood damages, economic development, etc., to answer specific questions of the Corps of Engineers in the investigation.

Senator KUCHEL. The next in order is Hon. Virgil O'Sullivan, member of the California Senate.

Senator?

STATEMENT OF VIRGIL O'SULLIVAN, STATE SENATOR OF CALIFORNIA

Mr. O'SULLIVAN. Gentlemen, my name is Virgil O'Sullivan. I am State senator in the eighth district of California. I am an attorney and also a rancher. My family lived in the eighth district, which is the west side of Sacramento, since 1851.

I have been interested over the years in the water development in that particular area.

On your right is a map which is furnished by the Bureau and it shows the projects with which I have been interested for many, many years. It is called the Sacramento Valley Canal.

This is the canal commencing at Red Bluff and running south. This is what is called the Corning Canal.

The CHAIRMAN. Is that contemplated to be a joint project of Federal and State, or——

Mr. O'SULLIVAN. This is an entirely Federal project. The water for this canal is to come from the Trinity diversion and Trinity Dam, which is under construction.

I want to say just a bit about the history of this because I think it is typical of the development of water of California and I think it also might be of information in development in other parts of the United States. When we first started working on this canal, as you note, these lands are all adjacent to the Sacramento River. Many of us who were interested felt that there was sufficient water in the Sacramento River left after the construction of the Federal Shasta Dam to supply these areas adjacent to the river. When the U.S. Congress held its hearings here in Sacramento in 1950 it was ascertained that there was no water left in the Sacramento River, so on the basis of that we had to go for a new project on the Trinity to furnish lands which formerly would be furnished from the Sacramento.

The development of water in California followed about the same pattern. Areas which are short and have a population and an immediate demand go into other areas and take the water. Then these areas that are later to develop are forced to go outside of their own watersheds to acquire water so that they can develop. This is an entirely agricultural development so that it does not have the features in it that you have in the State water plan. There is no urban supply. There is no industrial development there requiring water at the present time.

There is one thing that I wanted to convey to this committee in regard to development and policies.

The present system of policies which have been developed under the Reclamation Act since 1902 I feel are probably the best set of policies for farm development that we can get. The acreage limitation as it has been applied and will be applied is probably the finest thing for the development of a sound agricultural economy in the Central Valley that we have.

I hope that not only will the Congress of the United States in formulating further policies, I hope that they will not only follow the existing law but that they will in the future implement and strengthen that law for whatever developments we may have in the State of California under Federal funds.

The CHAIRMAN. You are talking about the acreage limitation?

Mr. O'SULLIVAN. The acreage limitations.

We have similar problems within the State water plan which we are working on at the present time. These policy determinations have not yet been made by the legislature. I carried the exact same amendments which are found in the Reclamation Act. I introduced them as a bill and as a change in the State water plan in the State senate in this last session. But these amendments were defeated. However, there are studies going on right now in the State on this particular policy question.

Senator KUCHEL. Thank you very much, Senator.

Any questions?

Thank you, sir. The committee will now be pleased to hear the chief executive of our State. Governor Brown is a long time friend of mine. We are glad to have you before us, Governor.

STATEMENT OF HON. EDMUND G. BROWN, GOVERNOR OF THE STATE OF CALIFORNIA

Governor BROWN. Senator, that friendship is very mutual.

Let me take this opportunity before I begin to tell you that I appreciate very much the statement that you made yesterday with respect to this water program because I am as convinced as you are in these water problems of our State that we have to take a bipartisan attitude and we do not want any partisan advantage from victory in this thing at all. Your statement was very much appreciated by me as the chief executive.

Senator KUCHEL. I thank you for that, because none of us want any partisanship or politics or sectionalism. This has been a rather interesting show, Governor, if you will give me a moment. We have been

barnstorming across the country from one city to another. Our chore, however, has been enriched by the occasional homely, even light philosophy by the Senator from Oklahoma and some of his earthy comments on problems of today. I remember one particularly that I think is appropriate at this time. The Senator is inordinately proud of his State as he has a right to be. The other night he was discussing the viewpoint of Oklahomans, and although in the privacy of our rooms was referring to them as Okies. He said they loathe any cartels of any kind, internation, national, or otherwise. He says, as a matter of fact, an Okie is against any combine he "hain't" in on.

I think that is particularly appropriate because here is one opportunity, Governor, where regardless whether we are Democrats or Republicans, live in the north or south, in cities or in rural areas, we are all in on this combine.

Governor BROWN. Thank you very much. Shall I proceed with this statement?

The CHAIRMAN. Yes.

Governor BROWN. First, of course, I want to express my appreciation for your coming out here to California and looking into this whole question of water resource development. I can tell you that among the many problems here in California that this is as vital if not the most vital, if that is not a redundancy, in California, the problem of water development.

I am very happy that you have given me the opportunity to appear before you today.

My understanding of the problem you are exploring, Mr. Chairman, is the present and future water needs of the Nation in relation to our economic and population growth. For us in California, I repeat that this merits serious attention.

The State of California as having an influx of population at the rate of over 500,000 per year. Experts inform me that by the year 2020 California's population can be expected to total some 57 million people, more than three times its present population. It is estimated that half of this population will live in the nine southern California counties south of the Tehachapi Mountains and the balance in the northern two-thirds of our State.

In 1950, 80.2 percent of our California population was residing in metropolitan areas as compared to a national figure of 56.8 percent so located. Twelve out of fiftteen million population now reside in metropolitan areas. It is anticipated that within the next 15 years 9 million more people will reside in these areas. In other words, by 1975 the metropolitan increase will equal the present combined populations of the San Francisco Bay and the Los Angeles metropolitan areas.

This characteristic of a rapidly expanding population is not unique to California. The same metropolitan growth is occurring throughout the entire West and indeed in the entire Nation. On a national basis from 1900 to 1950 the population of our country nearly doubled while the population areas denoted as metropolitan grew 177 percent or at a rate of 80 percent faster than the rest of the Nation. During the period 1950 to 1956 nearly 85 percent of the population growth of the United States occurred in metropolitan areas. If these areas continue to receive 85 percent of the national population growth, they will in-

crease 59.5 million people by 1975. And all experts agree that the greater rate of increase will occur in the West.

If the Nation, and particularly the West, is to be able to accommodate these tremendous numbers of people, it is imperative that we make available that one basic element, water, which is vital to their sustenance and their income. This is a matter which is important, not only to the States of the West, but to the Nation as a whole. It is so vital that it requires a reexamination of our existing national practices and policies of our water resource development.

The conditions underlying our western economy have changed greatly since enactment of our present reclamation law in 1902. Yet applicable public policies and criteria have changed very little. In 1902 the principal purpose of our reclamation law was to provide water for agriculture. Now our water resources policies must be geared not only to agriculture but also to our vast population and industrial needs.

That is why I tried to preface these remarks with the changing conditions from the rural to the metropolitan areas.

The basic purpose of reclamation law was and is to provide water for people—to permit them to establish and maintain homes—to give them a basis for income—and enable them to have sustenance.

When the West was essentially agricultural this could be accomplished by providing water for irrigation. Of course, water was also furnished for miscellaneous domestic and industrial purposes. But this was done only as an incident to furnishing water for agricultural use.

The character of the West has changed and is changing. Reclamation law and development should change with it. Urban development is increasing, industrialization is advancing rapidly in the West, and water is as vital to those kinds of growth today as it was for agriculture years ago.

I am not suggesting, and I want to emphasize this, that we change reclamation activity in the sense of deemphasizing water development construction for irrigation needs. I am suggesting that we enlarge the scope of activity to bring greater emphasis than historically has been given to domestic and industrial uses of water.

The population which is migrating to the West and especially to California is, I repeat, settling in our urban areas. While dependent upon agriculture for food and clothing, it must depend upon industry for much of its living and direct income. It must have water for drinking and the maintaining of its homes. The same basic needs must be met whether these people live on farms in the country or in apartments in the city.

Whether the West is entirely agrarian or entirely urban, or whether it remains, as I predict that it will, to a large extent both rural and urban in character, it must depend upon water resource development to sustain its population. This is true of our entire Nation. I submit that we must eliminate from our thinking and from reclamation law the philosophy that to justify any water resource development at all, it must be found to be able to serve uses which are primarily agricultural in character. We should remove from our basic concept the thinking that agricultural use should be the condition precedent to

water resource development. We cannot afford to apply 20th century law or 20th century philosophy to 21st century facts.

Nor should we restrict the area of activity in this connection to the lands of the West. It is becoming more clear daily that water resource development is going to become increasingly important for the urban areas of the East also.

I therefore urge you that in your deliberations you consider the reshaping of Federal water resource policy so as to provide for the construction of facilities which may have as a primary purpose the furnishing of water for domestic, municipal and industrial purposes as well as the construction of works principally for serving agricultural needs. Such action requires no change in philosophy since the basic philosophy is that of making water available to people. It requires only a change in the mechanics for implementing that philosophy.

I realize that my suggestion could very well mean a substantial increase in Federal investment in the field of water resource development But we cannot afford as a Nation to overlook the expanding needs of an expanding population. Our expenditures in the field of international cooperation or in the field of national defense will be of little avail if we have nothing to defend, or if we do not have a proper economy upon which to base our expenditures in the field of international cooperation.

Even from a business standpoint it makes good sense for the Federal Government to expand its conservation activities as a benefit to the entire national economy. For example, Federal taxes from reclamation areas total more than $3½ billion since 1940, 11 percent more than was spent for project construction since its inception in 1902. These papments are in addition to regular project repayments which return in the form of water and power revenues 92 percent of the funds expended for reclamation projects. A study based on Federal Internal Revenue collections reveal that farmers and townspeople in the area of westren reclamation projects paid $340 million in income taxes in the 1958 fiscal year alone.

This should be compared with the fact that our entire public works appropriation for this year, including reclamation, flood control and other activities, amounts to only 1½ percent of the total approved for all Federal activities.

Certainly an expansion of these activities both in the field of irrigation and municipal and industrial uses of water should result in even higher returns to the Federal Government.

I am not advocating that in the field of domestic or industrial water supplies, or in the field of power development, the costs should not be repaid in its entirety and with interest. However, I do feel that the Federal Government should be encouraging and engaging in this kind of development on the basis that it is difficult, if not impossible in many instances, for local agencies to finance it because of the magnitude of the project or the high interest rates which are attendant with them.

And this brings me to a second point. It occurs to me that in many instances the Federal Government could encourage local construction with resultant savings to the Federal Government by expanding its lending program in such fashion as to permit the local construction of

water development projects upon the basis of loans by the Federal Government. A step in the right direction was taken with the Small Projects Act of the Federal Government. But I believe that this activity should be pursued further and the program expanded as was suggested in legislation introduced in 1956 by two members of your committee, Senator Kuchel and then Congressman and now Senator Clair Engle. It was their suggestion that a procedure be developed for the granting of Federal loans to local agencies for the construction of projects which are primarily municipal and industrial rather than agricultural in character.

At this point, I believe it would be appropriate for me to point out to you what California is doing for itself in this field of water resource development. I assume that you have had some background on this by previous speakers here this morning, and I don't know how much of mine will be repetitive.

The CHAIRMAN. Give it. It is very interesting, Governor.

Governor BROWN. It has been estimated that local agencies within our State have invested some $4 billion in water resource development. In order to implement this local construction and recognizing that we cannot depend upon the Federal Government to do the entire remaining job for us, the State of California as such has embarked upon a program of water resource development. During the last session the legislature approved for submission to a vote of the people in November of 1960 a bond program in the amount of $1,750 million to be expended for water resource development. The California Legislature itself has already appropriated over $125 million for this purpose, and I think in the last session of the legislature they appropriated for this year $76 million for statewide water development in California, which is pretty good evidence that we are trying to do our share. When you line that up against our needs for education, grammar school, high school, junior college, State college and university, prisons and mental institutions, with people coming out here, you can see that the people of the State of California are willing to do their share, and their problem is one of financing, of getting this, of where we are going to get the money, who is going to be our banker in this thing, is the Federal Government going to help us, or are we going to have to rely completely upon the people that will buy our bonds in Wall Street?

The program will consist of the construction of Oroville Dam on the Feather River, which will provide flood control, water for irrigation, municipal and industrial needs and power resource development. There will be five upstream resources, the first of which I dedicated a few days ago, to provide water, flood control and recreation facilities for this north country which is also so important when you have 15 million, where are they going to go for a weekend, where are they going to take their families to breathe God's fresh air? When we do all these things we have to think equally of recreation and where they can get out in this so-called age of leisure that we are going to have, to do it. We are thinking of that right alongside of the more important economic needs of supplying water just for drinking. Beautiful country up there, too.

There will be water supply and protection works in the Sacramento-San Joaquin Delta. There will be North and South Bay

aqueducts to transport water from the delta to the counties of Marin, Napa, Solano, Santa Clara, Alameda, and Contra Costa, where we are experiencing at the present time our greatest metropolitan growth.

There will be the main aqueduct, which will extend from the delta south of the Tehachapi Mountains to serve areas as far south as the Mexican border with much needed water and the community of San Diego in the southernmost part of the State are supporting this bond issue almost 100 perment because that, too is a wonderful area and people want to live down there. On its way this conduit will serve the southern portion of the San Joaquin Valley. There will be the San Luis Reservoir.

The CHAIRMAN. What kind of a conduit will that be, Governor?

Governor BROWN. It will be another river. That will be the effect of it.

The CHAIRMAN. It will be actually a canal?

Governor BROWN. A canal.

The CHAIRMAN. It will not be a pipeline?

Governor BROWN. No. No, it will be—the present Central Valley project is literally another river. That is what it amounts to. It is a river moving all the way down from the delta, all the way down through Bakersfield, through the Tehachapis. It will have to tunnel through the Tehachapi, let the water drop down on the other side. There will be power development. And then by conduit all the way down to southern California.

The CHAIRMAN. Mr. Banks gave a very fine statement on that and indicated the ultimate objective of the first phase of it will be 4 million acre-feet delivered to the southern terminal and the maximum lift in the project will be some 3,300 feet, which will be offset by power development, including use of 1,600 feet of fall on the other side, leaving net lift of 1,700 feet. I would like to ask you this question:

Does the contemplated project include the lift of all of the water to that height or is part if it to be taken out before the high point in the lift is obtained?

Governor BROWN. I will have to ask for some expert advice to answer that question. Is Harvey Banks here? Harvey, can you come here just a minute.

He doesn't have the answer? If he hasn't the answer on the engineering phases of it, I haven't.

The CHAIRMAN. I hadn't asked him that question.

Governor BROWN. There will be all along the route of this new river there will be outlets that will take care of the area all the way through there.

The CHAIRMAN. I wondered what part of the water, Mr. Banks, would require the maximum lift?

Mr. BANKS. Senator, answering that question, I think it is easier to refer to this map. That portion which lies roughly south of this point here, the southern California in this area, plus out here in the Antelope Valley-Mojave area, all of the water into that will require the lift.

The CHAIRMAN. Maximum lift?

Mr. BANKS. Yes.

The CHAIRMAN. Percentagewise what part of the water will that be?

Mr. BANKS. Out of the project as it is now authorized, about 50 percent.

The CHAIRMAN. About 50 percent?

Mr. BANKS. About 50 percent.

Governor BROWN. How many acre-feet of water will you be sending over the maximum lift?

Mr. BANKS. To meet year 2020 demand, about 3½ million acre-feet.

Governor BROWN. And ultimately there will be 3½ million feet annually that will be sent?

Mr. BANKS. Under conditions of 2020, 60 years from now. It will gradually build up as shown by the dotted line on that chart over there.

The CHAIRMAN. You mentioned 2020.

Mr. BANKS. Between 1970 and 2020.

Governor BROWN. I think you might be interested in knowing—I think, Harvey, the Senators should know, when do you anticipate delivering water under present foreseeable demands to southern California?

Mr. BANKS. 1971.

Governor BROWN. So that in only 11 years away. It will take 11 years starting right now, which we are doing, to complete construction down to southern California.

The CHAIRMAN. Governor, I said before you got here and I want to say it again to you, I think it is a product of such boldness and daring to challenge the imagination, not only of your own people but of the Nation, and I think it is one which should challenge the Federal Government for appropriate encouragement and anticipation.

Governor BROWN. Thank you very, very much.

Now, here is where I come in with my story.

There will be the San Luis Reservoir which I earnestly hope you will support for authorization early in the next session of the Congress for construction as a joint venture by the State and Federal Government, to serve both Federal and State service areas. There will be a vast drainage system in the new San Joaquin Valley. In addition to this direct line of this new river that we will create, we are providing in this bond issue $130 million for lines and grants to local agencies, a program very much akin to the Federal Small Projects Act for the construction of similar projects to meet more localized needs. This development will occur principally, if not entirely in the northern part of our State. All of this will be paid back over a period of years and we will then pour that money back into new construction as growth demands.

One of the principal deterrents to the State engaging in this activity, and I am sure it is an equal deterrent in other States, is the high cost of money for financing construction such as this. This is what you and I talked about at breakfast this morning and I say this, that your reputation for the understanding of this problem which is a very difficult thing, what we are going to do about the high cost of money, your expertness on this is second to none in the entire United States. I do say this, Senator, that I hope your views will prevail

in the next session of the Congress because you have no conception how, as we sell these bonds we are trying to do this ourselves, where we are not calling upon the Federal Government for grants and things such as that. What a deterrent it is and what fodder for argument as to high cost of this project. One of the principal opponents of our project will tell us it will triple in cost over the period of the next 50 or 60 years. There is an element of truth in that with these high interest rates and that argument becomes better and better when the Federal Government is financing these projects with 5-percent interest on short term loans.

The CHAIRMAN. Governor, I want to say that one of the most encouraging things about my visit is to find your attitude on that. When your people and the people of this country, who are required to provide the money to build hospitals and schools and roads and water projects, realize that if they bring their will to bear on the Federal Government they can expect a favorable response, they will be encouraged to attempt to borrow money at a reasonable cost interestwise so they can do their part in the development of these necessary projects for the health, welfare, growth, and expansion of our country. I greatly appreciate your feeling about that and your expression of it and the defense which it constitutes of the feeling on the part of the people about that program.

Governor BROWN. Senator Kuchel, let me point out one thing, during the first 6 months of this year we saved $7 million by not filling jobs and other economies that I am not going into. We lost that entire $7 million in savings, so they tell me, and the financiers will have to, in higher interest rates in the sale of the veterans' bond issues here in this State. I cannot give you any answer to this but something has to be done about the high interest rates or we are going to be—I go to the people of California and ask for $200 million more in taxes and I find out that an equal amount of taxes is going to the bankers and the people that buy these bonds in the form of higher interest rates.

Senator KUCHEL. Governor, let me just make this comment. You touch upon an extremely complex, difficult problem that does concern all of us in and out of government. Although somewhat irrelevant to the water problem, this important subject fits into a picture of this country since the close of World War II, contributing substantially, perhaps almost entirely, to the rehabilitation of war-ravaged countries of Europe and Asia.

Just a couple of weeks ago I read a most interesting speech by Secretary of the Treasury Anderson to the people representing the Export-Import Bank in the international banking organizations of the world. He indicated that our country cannot continue to pick up the complete check of underwriting the securities of countries abroad who, like us, yearn for freedom but that we now should look to our friends in freedom loving countries—to name a few of them, Germany and Italy—who at one time were fighting us and are now competing with us. This whole problem involves how much money this good government of ours in California is going to have to pay for what it borrows. Certainly the only thing I can say here is that there are divergences of views on it. Surely everyone connected with that problem does want to bring the value of money or the cost of

money as best it can to the accommodation of both public and private sources.

Governor BROWN. It occurs to me in that same connection that a field for serious consideration, and it is completely related to what I am saying, that your committee should be looking toward developing a program in addition to existing programs which would provide for the lending of money to States on a low interest basis in such manner as to encourage State activity in this field.

Senator ENGLE. Governor, would you yield there for just an observation?

Governor BROWN. Yes.

Senator ENGLE. You know we set up two international development funds. We set up one for South America. Now we are working out another. The purpose and function of those is to provide low cost money for foreign nations to develop their natural resources. In line with what you suggest there, it seems to me to make sense to apply a little of that kind of aid right at home. I am in favor of dollar for dollar on that kind of business.

Governor BROWN. I envision that a Federal corporate structure could be created which could maintain a revolving fund for the purpose of making loans to States for this type of activity on a low interest rate basis which would still be sufficiently high to be revenue producing and permit expanded Federal activity in this field. At the same time it would encourage and facilitate State action, even if such loans were granted for only a portion of the project, it would go far toward making it more practicable for the States to engage in this type of activity. We need—we cannot go too far, of course, but in an expanding economy it seems to me that everybody seems to be unanimous upon—we have to encourage the States to move ahead, too. Here in California our bond program involves a sale and use of our bond issue over a long period of years, some 20 or more years. This program itself could be adapted to the revolving fund I have described and be of benefit to both the United States and California.

To encourage multipurpose development in this field the Federal Government will be assisting in other spheres of action, also. It will facilitate the provision of low-cost power to attract industry and it can provide an expanded area of recreational development which also is vital to an increasing population.

I believe a pattern is being set also which could provide the basis for expanded activity by the Federal Government in our proposal, the construction of the San Luis Reservoir. In the construction of that facility our State will engage in a partnership with the Federal Government in the construction of this necessary reservoir. Certainly if this kind of cooperation can be expanded it will lessen the burden on the Federal Government and at the same time permit a more rapid development of the national economy.

By way of summary, therefore, I would urge that in your deliberations you consider the following:

1. An equal status under reclamation law for the construction of works to serve water for municipal, domestic, and industrial needs as well as agricultural needs.

2. An expansion of the small projects concept, to include loans for projects which are primarily nonagricultural in character.

3. A program of Federal-State cooperation whereby the Federal Government would provide loans to States on a low interest rate basis for the construction of major water projects.

4. A program involving joint Federal and State construction of major facilities and finally;

5. A greater emphasis on recreational facilities in the development of our water resources.

I want to thank you for this opportunity to appear before you and express my views. I think it is great that you come out here and visit other States so that you get a little feeling of our problems and we get some of yours.

Senator KUCHEL. Governor, thank you very much for an excellent statement.

Any questions, gentlemen?

The CHAIRMAN. No questions. I want to express my deep appreciation to not only the Governor but also to the members of the official family and others here who made such challenging statements. Certainly the outstanding statement was made by your great Governor, and I wish to state to him that he and his colleagues have made a magnificent contribution, not only to the knowledge of this committee and through it to the Congress and the people, but I am keenly aware of the contribution you are making to the sum total knowledge of its chairman.

Governor BROWN. Thank you.

The CHAIRMAN. With which I am very much interested.

Senator KUCHEL. A very worthy project, I would say.

Senator Young? Senator Engle?

Senator YOUNG. I would like to compliment you on a very good statement. I was particularly interested in the part in which you emphasized the greater need in the future of furnishing water to the urban centers through the reclamation program. We have a greater need even in a State like mine. Many of our cities are short of water now. The only way I can see you can provide it will be through a change in the reclamation program.

Governor BROWN. Thank you. I am glad we are in accord on that.

Senator KUCHEL. Governor, are you optimistic about the prospect of reconciling some of these unfortunate divergences of view with respect to this water?

Governor BROWN. Senator, I am an optimist by nature and I am sure that you are, too, or we wouldn't be in politics. But I am absolutely convinced that this bond issue will be passed by the people of the State of California. We intend and we are working now on the forms of the contract and the people will know the form of contract that we intend to submit to all areas of the State long before November and probably before the budget session. We have not as yet completed our studies in that connection and I am not prepared to tell you what we will do. But bond lawyer, Mr. Harrington, has advised me on the bond issue itself that he would recommend that the bond buyers buy it and of course you know that he, from your experience as controller, that he is the "Supreme Court" on the legal validity of the bond issue itself. There are some lawyers in the south who I respect very much who feel that there should be a supreme court test but I don't believe in going to court on anything where the title companies

are willing to give me a title policy and that is the effect of Mr. Harrington's opinion in this matter. So that will take care of the legal phase of this. As far as any further guarantees to the north or to the south, we fought that out bitterly in this session of the legislature.

When the bill was finally passed, it was passed with the help of men like Senator Murray and Senator Tobrisher, Representative Andem in southern California and the help of Senator Burns and Senator McInteer and I only cite them as an example in southern California. Neither side was completely satisfied. If we completely satisfied either side we wouldn't have had a bill, believe me. We had to compromise some of these things. I regret very much that one or two individuals in the Metropolitan Water District want to refight that fight at the next session of the legislature. On that phase of it there will be no further fight as far as I am concerned, because I will not put it on the special call. If there are some technical difficulties on the question of the so-called unjust enrichment which we are studying along with the others, those are matters that I would like to consult on with people who are as interested in it as I am. I would like to counsel with you and Senator Engle, because you know this California problem. You and I sat in the water projects authority together for a long time. We talked about those things. That I have an opposite mind on. I want to get all the evidence before we move.

Senator KUCHEL. Governor, in connection with the contracts contemplated, will they require any legislative sanction or not, or is that the question?

Governor BROWN. I don't think they will. I don't think there will be any legislative action necessary, at any rate not at the special session. If the legislature doesn't like the contract that we offer in the 1961 session, they of course will retain control of that continually. They can change it. They can modify it. That will be the job of the legislature to determine.

My problem is somewhat of a political one. How far should we move in this next, in this special session? Will we create more difficulties than we will solve by trying to fight out all of the details at the special session? I will be talking to you two politicians about that before I get through with this thing.

Senator ENGLE. May I ask a question, Senator?

Governor, I observe in your statement that you have recommended that the Federal Government do some additional things with respect to financing these projects. You said, for instance, that you thought that this small loans program ought to be expanded to include projects for other than agricultural purposes. You have said that you think we ought to have some kind of a loan program through the Federal Government at long term and low interest rates that will enable the States to finance these major projects. You have suggested that we ought to arrange a basis for cooperation between the State and Federal Government for building major projects. I assume you have in mind the sort of thing that we have done on the Oreville Dam, where we put up the flood-control money, and the sort of thing that Senator Kuchel and I are trying to do with the bill we introduced this last year.

Governor BROWN. When you were out of the room I specifically mentioned the Kuchel-Engle bill, that small loans bill that you originated.

Senator ENGLE. If you had your choice, you couldn't get them all, which would you prefer? Would you prefer a program that provided long-term loan interest rate Government assistance, repayable to the Federal Government at an interest rate or would you prefer the other type of program where you have in effect Federal contributions, one of a non-interest-bearing basis and the other on a nonreimbursable basis? Do you have any views about that at the present?

Governor BROWN. I would rather not give a priority on that. I would like to weigh that. I have not thought that one out. I would like to have them all and would not like to retreat at this moment.

The CHAIRMAN. Would it be well to keep the objective of all and achieve each one as it could be done?

Governor BROWN. You say it very well, Senator Kerr. I don't want to advocate either one of them today.

Senator KUCHEL. Thank you very much, Governor.

Governor BROWN. Thank you very much, Senator.

Senator KUCHEL. For the information of those present, it is the committee's desire to continue through the noon hour and into the afternoon.

The next witness will be the Honorable James Cobey, member of the California Senate.

STATEMENT OF HON. JAMES A. COBEY, STATE SENATOR, CALIFORNIA

Mr. COBEY. Mr. Chairman, gentlemen of the committee, I want to say at the start that from the testimony you have heard thus far I represent a vanishing species, the American farmer.

I appear before you today to make a personal statement in my capacity as a member of the California Legislature who has spent considerable time on water problems of the State. In addition to my legislative work in this field, I do most of the legal work for one of the largest irrigation districts in the State, the Central California Irrigation District, which serves approximately 150,000 acres on the west side of the San Joaquin Valley in the central part of California.

Since entering the legislature in January of 1955, I have served on various standing and interim committees on water problems and was a member of Governor Knight's Water Lawyers Committee which worked unsuccessfully in 1957 to formulate an overall amendment to the State constitution on water-resource development.

You are undoubtedly aware that the maldistribution of water is the one great ceiling on California's development. You are also undoubtedly aware that the State government has decided to remove this ceiling by undertaking a very ambitious program to develop for the most part the remaining undeveloped water resources of the State in a coordinated and integrated fashion on the assumption that if this is done, California will have sufficient water developed within its borders, aside from its share of the waters of the Colorado River, to take care of its ultimate population, which is now estimated to be in the neighborhood of 57 million people.

What I want to emphasize to you here today is that in taking this course California does not intend to discourage, interfere with, or prevent water development within this State in the future by either the Federal Government or local government. Although the primary responsibility for making certain that all areas of this State will have the water that they need, at a price that they can afford, will rest upon the State, it is expected that both the Federal Government and local government, which are the levels of government that have developed the water that we have in California today, will continue in their role of water developers, but that such development will be coordinated with the State's master plan.

The two counties which I represent in central California are agricultural counties. I think I can say on their behalf and on behalf of the entire Central Valley of California, which is now and will remain as the principal agricultural area of California, that the California agriculture wants the Federal Government to continue in the roles that it has heretofore had in California of developing flood control projects through the U.S. Army's Corps of Engineers and essentially agricultural water projects through the Department of Interior's Bureau of Reclamation. I might say that we desire the continuation of these programs in California if they can be continued on the basis on which they now operate.

As you gentlemen probably know, the California water plan at the present time makes no provision for flood control, aside from recognizing it as one of the purposes of multipurpose water development projects. It is expected, therefore, that flood control in California will be handled in the three-way partnership that has been generally followed in this State since the end of World War II. That is, the Federal Government will continue to build, at exclusively Federal expense, those projects whose basic or primary purpose is flood control; the State will provide, at its expense, the land, easements, rights-of-way, and relocation of utilities necessary for such projects; and local government will provide the operation and maintenance of such projects, and indemnify the other two levels of government with respect to such projects.

The continuation of Federal flood control work in California on this basis is, of course, important to California agriculture, but it is not particularly and peculiarly important to California agricultrue as distinguished from the other basic segments of California economy.

On the other hand, the continuation of the work of the Bureau of Reclamation in California on an accelerated basis, if possible, is absolutely vital to the continued existence and to the future expansion of California agriculture. This is because Federal development of water can be expected to be substantially cheaper than State development of water, and the California farmer requires comparatively cheap water, generally speaking, if he is going to continue in production, and going to be able to expand that production to the extent that an expanding market makes such expansion necessary and desirable.

Of course the statement that federally developed agricultural water will be cheaper than State developed agricultural water rests on the assumption that the Federal Government will not change its present practices and policies which make such water comparatively cheap.

I refer first of all to the fact that some of this water development will involve use of certain of the Central Valley project facilities which have already been constructed. Since these facilities were built during a much lower level of prices and construction costs than are prevailing today and probably in the future, the use of them will be much less costly than new facilities. Secondly, as we all know, the Federal Government subsidizes agricultural water in two basic ways: (1) it requires no interest from the irrigators on their delayed repayment of the capital cost attributable to the irrigation cost, and (2) excess power revenues are committed to assist on the payoff of that portion of the capital cost of a multipurpose project allocated to irrigation. Since, in all probability, the State will have to borrow much of the money it uses for water development, it cannot furnish water to irrigators interest free, and since the State water development system may have an overall power deficiency rather than a power surplus, there will not be available to State-developed agricultural water this source of subsidy in an amount at all comparable to that now prevailing in many Federal reclamation projects.

It is this rather substantial difference in the probable costs of federally developed agricultural water as compared with the costs of State-developed agricultural water that makes its absolutely essential to the California farmer that the Bureau of Reclamation remain in business in California, so to speak, to operate on the same basis as it does today with respect to the Central Valley project. The only desire of the California farmer in this respect is that, if possible, the Congress appropriate even more money for the operation of the Bureau of Reclamation in California. In other words, the California farmer would like to see more, not less, Bureau of Reclamation projects in California, both in the immediate future, and in the not so immediate future.

He would also like to see joint projects. I believe that the contemplated San Luis joint project, which, incidentally, is located within my legislative district, shoud furnish a real pilot study as to how our two levels of government can effectively cooperate in a joint water development project.

I think also that Senator Engle's proposed legislation which would grant to the appropriate agencies of the Federal Government a blanket authority to make contributions to the State multipurpose water development projects for the Federal purposes incorporated in such projects, such as flood control, navigation, fish and wildlife enhancement, and preservation and irrigation, is an excellent idea, and should be passed by the Congress so that the Federal Government can effectively participate at an early date in the California water development program.

Thank you for the opportunity to appear before you, and to state my personal views on this subject of water development in California and particularly the Federal Government's role in such water development in the future.

Senator KUCHEL. Mr. Cobey, that is an excellent statement. I thank you very much for coming before us.

Are there any questions?

Senator ENGLE. I would like to compliment Senator Cobey on that statement and say that I am especially gratified that he mentioned the

legislation that we have pending back in Washington which would apply the traditional policies of the Federal Government with reference to construction of projects multipurpose in character where those projects take over and handle functions normally handled by the Federal Government, such as flood control and irrigation. I think it goes a long way in helping us finance some of these major projects which is, of course, a big problem.

Mr. COBEY. Mr. Chairman, Senator Engle, thank you very much. If I may just add a word I would like to emphasize on the basis of the hearings that the Teale committee held here last week, and I happen to be a member of that committee, I am personally convinced more and more that at least the Central Valley, California, farmer is very probably going to be priced out of the State water development program. If that should occur, then that segment of the California agricultural economy, which is by far the largest segment, is absolutely dependent so far as obtaining the necessary supplemental water to continue to operate and to expand in a reasonable fashion. We are absolutely dependent upon the Federal Bureau of Reclamation program.

Senator KUCHEL. Thank you, sir.

The next witness is Mr. E. A. Reinke, chief sanitary engineer of the California Department of Public Health.

STATEMENT OF E. A. REINKE, CHIEF SANITARY ENGINEER, CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

Mr. REINKE. Chairman Kuchel, Senator Young, and Senator Engle, this statement is being presented at the request of Dr. Malcolm H. Merrill, director of public health. It is very brief but it was his feeling that these points were of sufficient importance that they should be presented to you.

STATEMENT OF MALCOLM H. MERRILL, M.D., DIRECTOR, CALIFORNIA DEPARTMENT OF PUBLIC HEALTH, AS PRESENTED BY MR. RANKIN

WATER SUPPLY PROBLEMS IN CALIFORNIA OF NATIONAL INTEREST AS RELATED TO PUBLIC HEALTH

Water is a basic natural resource and water of good quality is essential to healthful living.

In California, the State department of public health is charged with the responsibility of supervising public water systems to ascertain that a pure, wholesome and potable supply is furnished to consumers. The department also has supervision over the sanitation, healthfulness, and safety of public swimming pools and bathing places. Under its general powers to protect the public health, the department is concerned with the protection of parks, playgrounds, and irrigated crops from sewage polluted waters, with the prevention of insect and mosquito breeding and the avoidance of nuisance.

Since other California State departments are presenting views on the other questions in the agenda, this statement is limited to one question of particular interest to us.

What Should Be the Pattern of Water Development?

1. Water quality should be maintained at the highest practicable levels

(a) Direct use of waters for recreational purposes and for irrigated agriculture precludes the use of these waters to receive raw or inadequately treated wastes. Separate waste water systems or the reclamation of waste waters in such cases may be necessary.

(b) Water pollution control programs should give increasing attention to mineral quality of waste waters from communities, industries, and from agricultural drainage. The rapid increase in use of industrial chemicals, insecticides, weedicides, and chemical fertilizers has already markedly increased the mineral content of some receiving streams and ground water basins.

2. Mosquito control programs require planned waste water systems

Widespread irrigation usually results in difficult mosquito control problems unless an adequate drainage system is provided to accompany each water distribution system. The public health importance of mosquito control was graphically shown by the outbreak of mosquito-borne encephalitis in the Central Valley of California in 1952, with over 800 laboratory proven cases and 52 deaths.

3. Ground water basins require replenishment

Increasing withdrawals from ground waters are resulting in increasing mineral content and unless this trend is reversed by replenishment of ground water basins with good quality water, we may be forced to use dual water systems. This is already being done at Coalinga and at some smaller desert communities.

If the select committee desires more detailed comments on the foregoing points, the department will prepare them on request.

Parenthetically, our State agencies are giving consideration to the points we are presenting here. We are asking that the Federal Government also consider them.

I might point out the Governor has already mentioned the importance of urban water supplies and that is the interest primarily of this department. We are also, however, interested in the subject of recreation, which has been mentioned and in the question of farming as it relates to mosquito development.

I might add that I am sure you know of the work that is being done through the Congress in the water pollution control field which is along the line we are mentioning here.

Senator KUCHEL. Thank you very much, Mr. Reinke.

Any questions, gentlemen?

We will now hear Ray K. Linsley, executive head, department of civil engineering, chairman of the committee on water resources of Stanford University.

STATEMENT OF RAY K. LINSLEY, EXECUTIVE HEAD, DEPARTMENT OF CIVIL ENGINEERING, CHAIRMAN, COMMITTEE ON WATER RESOURCES, STANFORD UNIVERSITY

Mr. LINSLEY. Mr. Chairman and gentlemen of the committee: I do not know whether the representatives of the agencies concerned with water resource development have spoken to you of their staff problems as they have many other important problems to discuss. I am sure, however, that if they were to comment on this point they

would tell you that it is very difficult to employ new young men and women with specialized training in the many aspects of water resource management. Many agencies would tell you of the need to develop special inservice training programs to reeducate new employees whose basic preparation has not been specifically directed to the agency's are of interest.

There is nothing wrong with inservice training. It is essential for any large organization to provide such training. Universities cannot conceivably supply all of the educational details a man might require for any possible employment which he might enter. However, inservice training tends to emphasize the how-to-do-it features at the expense of the basic fundamentals. It tends to encourage inbreeding and stifle new ideas. It is well adapted to training subprofessionals and to the orientation of new professional employees to the aims and operation of an agency. A subject with such economic and social importance as water resources warrants an adequate program of university and college instruction. Statistical data on education in this area are scanty. A survey in 1957 by the U.S. Bureau of Public Roads indicated that at that time only 7 percent of the graduate students in civil engineering in this country were specializing in the area of hydraulics. This percentage has probably changed but little since then. Applying it to the 879 postgraduate degrees in civil engineering granted in 1958 by the U.S. Office of Education suggests that there was a total of about 60 degrees in this area. A large percentage of this group was, however, specializing in fluid mechanics and will find careers in fields quite unrelated to water resources. There is no data for an estimate, but it seems probable that not more than half of these students are preparing for the field of water resources. The annual output is therefore about 30 graduates. Probably one-half of this group are foreign students who will return to their native lands when their education is complete. Thus no more than 15 or 20 specialists in water resources are graduated each year for employment in the United States—a small number, indeed, to distribute among the Federal, State, local, and private groups working in this area. It is also pertinent to note that enrollments in civil engineering programs are declining relative to other fields of engineering.

Another important area of water-resources planning is the field of ground water. There are no surveys here, but those of us in the business of education know that the output here is far less than in civil engineering, probably about 5 per year. In such other areas as fishery biology, water economics, regional planning, and so forth, the output is equally small. Only 68 advanced degrees in agricultural engineering were awarded in 1958, and here again only a part of this group are concerned with water problems.

I submit, gentlemen, that the output of young men and women in this area is pitifully small to meet the current needs and would be woefully inadequate if there were to be a substantial increase in activity in water-resource development. We are preparing large numbers of young people for careers in space technology, in nuclear development, and in the military services, but we are making no special effort to encourage young people into a field so essential to mankind as water.

I do not propose to try and suggest an immediate and all-inclusive solution to this problem. It has many facets. We are not sure why young people choose careers in other fields in preference to water resources. A few universities, such as Stanford and the University of California, have established programs in water resources, and there are signs of increasing student interest. Increased public awareness of the importance of water-resource problems and the need for properly educated personnel is needed.

An authoritative statement by this committee relative to the importance of this field would be a substantial aid in developing this awareness.

One hesitates to suggest that money is the solution to all problems. I am sure you have already been told repeatedly of the need for more funds for all manner of purposes. However, I would point out that the Federal Government now supports many students in university and college through direct scholarship grants or through support of research. This financial aid has been a powerful influence in channeling students into particular areas of study. In the minds of many students and a large segment of the public, this financial aid is a direct measure of the importance which our Government attaches to various disciplines. It would seem wholly proper for Congress to specify that a fixed percentage of any funds appropriated for water-resource development should be directed to the support of education in water-resource management through direct scholarship grants, support of research, or educational leave for civil-service employees. A similar provision for research support was included in the national highway program and will almost certainly pay for itself in improved effectiveness of the program. Similar benefits could certainly be anticipated in the area of water resources. There must be an adequate reservoir of trained personnel for the effective planning and operation of the water projects which this country now has and will build in the future.

Senator KUCHEL. Thank you, Mr. Linsley.

We will now hear Mr. Francis C. Lindsay, former member of the assembly, representing now the Northern California Soil Conservation District.

STATEMENT OF FRANCIS C. LINDSAY, NORTHERN CALIFORNIA SOIL CONSERVATION DISTRICT

Mr. LINDSAY. Gentlemen: the soil conservation districts of this Nation have long and consistently used a short slogan—"The treatment of each acre according to its needs." We find now that such treatment will also result in the best water conservation, and control in itself one of the best water development programs.

Some of the treatments that were considered in the exotic or dreamer class only 3 to 5 years ago have now shown such promise toward better water control and water production that they deserve much better treatment from the research angle for development.

For examples: (1) Brush and undesirable plant species removal; (2) timber cutting management to get better snow conditions and more snow on the ground; (3) weather modification; (4) sprinkler irrigation; (5) soil capacities and soil characteristics for each area.

For these reasons and many others, the soil conservation districts of this State joined with the university, the State departments, farm organizations, the water district associations, and the State legislature in presenting to Congress a request for a regional soil and moisture laboratory to be established on or adjacent to the University of California campus at Davis. You will recall that the legislature of this State twice offered to Congress the land necessary for such a laboratory, and that in this State every group or entity interested in water in any way joined in wholehearted support for such a regional laboratory. We sincerely hope you gentlemen will not let this proposal die.

We believe you are holding these hearings because water is critical in supply and quality all over this Nation. Any method to increase the usable supply anywhere may possibly be of use in other areas. We know that water saved is water made available for other things. The examples I gave you that deserve intensive research are all methods of increasing or saving water. We have over 18 million acres of brushland in this State, much of it can be renovated. Where some of it has been removed and grass cover established, streams have produced additional water up to one-half acre-foot for each acre of land. This would indicate a possible increase in water yield up to 5 or 6 million acre-feet in this State alone. We will spend $1½ billion on storage reservoirs for this amount of water so it would seem that we could afford some research money on this program.

The U.S. Forest Service is now doing commendable work on snow research to get it on the ground. Many people are amazed when they hear that snow will evaporate and as much as 25 percent of the water can be lost before the snow packs to hold it. The research program on snow is on a very limited scale but shows such promise that it cannot be ignored, especially since over 83 percent of all our usable water supply in this State comes from the timber area or above in elevation.

Weather modification has passed out of the witchcraft stage. We know it works, but our methods are crude in the extreme. Yet when one-half inch of rain increase is worth over $2 per acre in water, the potential of weather modification is staggering and certainly deserves more attention by research agencies.

Sprinkler irrigation is well established, but the rate of application, size of droplets, impact damage of droplets on soil and crops, and so forth, is not known. Since this is the one way to positively control water application to exactly what is needed and save vast quantities of water, we believe that this field of research has only been scratched.

Soil capacities and soils in general deserve tremendous amounts of study in relation to crops, water, and their relation to particular soils.

For example, a farmer may have a soils area right in the middle of a rice-producing area of sandy or high percolating soil that should never be planted to rice because of its excessive water loss. The accurate measuring of soil moisture for each soil type to find the optimum for water application has been started in many areas, but potential saving of irrigation water could run as high as 25 to 40 percent. Such a watersaving of good water already stored and distributed certainly begs for a set of better standards for water users to go by.

In speaking for the soil conservation districts of California, we have tried only to indicate a few of the important fields of water man-

agement needing attention and which could go a long way toward helping to solve our water crisis problem. We are sincerely and deeply appreciative of Congress creating this select committee and even more so of your own interest in serving on it.

Thank you.

Senator KUCHEL. Is the president pro tem of the California Senate present, the Honorable Hugh Burns?

Senator George Miller?

Senator J. Howard Williams?

The Honorable Carley Porter, chairman of the California Assembly water committee.

Senator ENGLE. He is going to appear, I think, Mr. Chairman.

Senator KUCHEL. He will appear tomorrow in Los Angeles.

The Honorable Lloyd Lowrey, the chairman of the California Assembly committee on natural resources.

We are delighted to have you here.

STATEMENT OF LLOYD LOWREY, CHAIRMAN OF THE ASSEMBLY COMMITTEE ON NATURAL RESOURCES, PLANNING AND PUBLIC WORKS, CALIFORNIA LEGISLATURE

Mr. LOWREY. Thank you.

Mr. Chairman, I express appreciation for being given an opportunity to appear before you. I am Assemblyman Lloyd Lowrey, chairman of the assembly committee on natural resources, planning, and public works, California Legislature.

I appear today as chairman of the California soil and water research facility committee. This committee has a membership of 44 individuals who represent various organizations in California. Its purpose is to encourage research in soil and water problems to the end that our resources may be utilized for the benefit of the people and that our agriculture will have an element of stability and permanence.

In reviewing the assignment of your committee, we believe that it is quite appropriate to consider the possibility of expanding the research programs in soil and water problems. Some of us have a very definite impression that too much emphasis is placed on planning big projects, working out engineering details, getting the authorization, urging the appropriations, moving the dirt, pouring the concrete, and throwing out hats in the air when the water flows under controlled conditions, with little thought to the complications which always follow in the wake of water conservation and irrigation.

So we urge your consideration of these serious soil and water problems which threaten our agriculture and which, at times, are brushed aside in our enthusiasm for building more dams and controlling more water.

If a comprehensive, expanded, and adequate research program on soil and water problems were to be the sole achievement of the select committee, then its deliberations would have been successful and its contribution to the permanence of the western economy would be recognized as being of a very substantial nature.

To review very hastily. We are certain that the members of the committee are familiar with the serious consideration which has been given by the Congress in recent years to the possibility of expanding

the soil and water research program. Senators Engle and Kuchel coauthored S. 905, 1st session, 86th Congress, and Congressman Moss introduced H.R. 2251. Both measures authorized and directed the Secretary of Agriculture to establish, equip, and maintain four regional laboratories to conduct research into problems of soil and water management and conservation. There was a slight difference in the wording of the two measures. H.R. 2251 included "four regional research laboratories, one to be located in the north central area, one in the southeastern area, one in the Great Plains, and one in the State of California." S. 905 included the three regions mentioned in the Moss bill, but included "one in the Pacific coast area" rather than specifically mentioning California. Congressman McFall introduced H.R. 3484 which was a companion measure to H.R. 2251.

The Department of Agriculture reported on similar measures in the 85th Congress that, although it favored the objective of the legislation, it did not recommend its enactment in view of the fact that the Department already has general authority for the construction of such laboratories. It appears to our Soil and Water Research Facility Committee that congressional action will be necessary in the form of a specific authorizing directive to stimulate the Secretary of Agriculture in this matter.

Members of the select committee will recall that in July 1958 the Senate Committee on Appropriations requested the Department of Agriculture "to make a study of facility needs for research on soil and water problems and to make a report to the committee on the scope of research results to be expected from existing facilities, and the feasibility of additional facilities. The report from the working group appointed by the Secretary of Agriculture was transmitted by the Secretary of Agriculture to the Senate Appropriations Committee on January 15, 1959.

A very limited number of copies of this 290-page report, entitled "Facility Needs Soil and Water Conservation Research," were made available for study by interested Members of the Congress and by citizens. In fact, you can say that the report was held under wraps in confidential status.

In connection with the consideration of "H.R. 7175, making appropriations for the Department of Agriculture and Farm Credit Administration for the fiscal year ending June 30, 1960," the Department of Agriculture submitted some very pertinent comments which are of great interest to the proponents of an expanded soil and water research program.

On pages 182–203, inclusive, covering the hearings before the subcommittee, on Monday, April 20, 1959, the Department of Agriculture, represented by Assistant Secretary Peterson, submitted a number of tabulations showing the estimated costs of implementing the recommendations of the working group.

My point in mentioning these matters at this particular time is this. Arrangements have been completed to have a thousand copies of the report of the working group printed. Known as "Senate Document 59," the volume will include the comments and tabulations of the Department of Agriculture referred to above, as well as the report. The costs of printing are being paid for by the National Reclamation Association, an organization in Arizona, and the

Water Economics Committee of the Irrigation Districts Association of California. Copies of Senate Document 59 will, of course, be made available to your committee in whatever number you desire.

This program was implemented through the committee which I am representing here today.

The California Soil and Water Research Facility Committee developed a 48-page report which was presented to the working group of the U.S. Department of Agriculture at the hearing in Sacramento in October 1958. Our report was printed by the Subcommittee on Water of the Assembly Committee on Conservation, Planning and Public Works, as volume 13, No. 21, of the 1957–59 Assembly Interim Committee Reports, of which I am now chairman.

We believe that our report includes some very appropriate and timely comments on the research problems on soil and water matters and forcefully presents the recommendation that a regional laboratory be established at the University of California, Davis, located about 13 miles west of Sacramento.

Copies of our report are being made available to your committee and we commend it to your attention.

I would also like to enter into the record the text of a letter which I personally mailed to Senator Engle and to you, Senator Kuchel, dated August 24, 1959, relative to the urgent need for research on water, in that some of the details as to what we anticipate might be done with this research are pointed out and I deeply appreciate you giving me the few minutes.

Senator KUCHEL. Thank you very much, and the text of the letter will be incorporated.

(The letter referred to follows:)

MY DEAR SENATOR: The purpose of this letter is to respectfully call to your attention some of our ideas in relation to Senate Resolution 48 which authorized the establishment of a Senate Interim Select Committee to study the matter of the development and coordination of water resources. We are extremely gratified that you are a member of this highly important committee.

The Nation's water problems are becoming increasingly more complex and should require the attention of all segments of our population. Our dwindling water supplies must be protected and judiciously used. Public and privately supported water development progress can accomplish these objectives if they are based on facts and sound information available when needed. We must have a visionary research program today which is geared to provide information in answer to the Nation's water problems of tomorrow.

Is our present program of research on water adequate? What could a realistic program of research on the Nation's water problems expect to accomplish in terms of extending short supplies of water to meet increasing demands already demonstrated as needed in the future? Can we now identify and describe the magnitude and intensity of need for research on water resource problems of the Nation?

These are only a few of the questions which I feel your committee might wish to consider in your study. All of us recognize that there are many facets to be considered in a balanced research program on water.

Enumerated below are a few of the areas which I feel might be illustrative of those which are critical to the Nation's agricultural permanence:

(1) Development of vegetative, chemical, physical, or other treatment of land surfaces coupled with engineering practices which would regulate runoff by improving water yield and simultaneously provide protection to our soil resource or reduce runoff for on-site use where contribution to streamflow does not occur.

(2) Ways and means of reducing or controlling losses of water through evaporation from soil or other surfaces, through reduction of transpiration

losses by better management and cultural practices for agriculturally important crops and safe elimination of nonbeneficial plants, and by reducing seepage and evaporation losses from canals, ditches, ponds, and reservoirs.

(3) Improving irrigation water management systems on a project and farm basis by development of better structures and devices for water distribution and measurement, better timing of irrigations to met crop needs, and elimination of excessive applications which add to present-day drainage problems.

These and other equally important water problems need solution at the earliest possible date if our Nation's agriculture is to remain strong. I respectfully request that research needs on water be given a thorough evaluation by your study committee.

This request is directed to you because rumors persist that the select committee does not contemplate an emphasis on research as one of the basic problems yet to be resolved. Many of us here in California feel that more research is long overdue, both locally here in our State as well as nationally.

Sincerely yours,

LLOYD W. LOWREY.

Senator YOUNG. I served with the subcommittee that handles appropriations for these research centers. I am wondering what your view is on establishment of further facilities? Would you prefer more new facilities or to expand some that we already have in existence?

Mr. LOWREY. After considering this at great length with legislators from all over the United States, I discussed this matter with them last week when we had our legislative conference group in Denver. I believe we have come to the conclusion that it would be more appropriate to follow the recommendation of Drs. Wadley and Whitton and the select committee that made that study that we make smaller appropriations to greater areas throughout the United States. It comes to mind that Wyoming has a particular problem. They would not need a particularly large lab. We have the porous soils up in the northern tiers of the State that need a detailed study. But they don't need one huge facility. Here at Davis, the State of California and the University of California in conjunction are building with what funds they have available, $47,000, I believe, additions to the irrigation facilities, purely and simply for research. Apparently we just cannot find the money to expand that research as we should. Now, if we could have the cooperation of ARS, Dr. Wadley and his group, to expand that, even in a small amount, then we could study these problems and coordinate the efforts along with the new lab which is being dedicated, I believe this week or next in Arizona, and also a slight expansion at Riverside, that is pointed out by the committee that their recommendation is that we not have these four large and expensive labs but that we put more smaller facilities in so that we could have our teams working out of a headquarters and cover the whole United States.

Senator YOUNG. Some of these larger stations do have substations in the State?

Mr. LOWREY. Yes, sir.

Senator YOUNG. And in other States.

Mr. LOWREY. Yes, they do.

Senator YOUNG. As you know, we have a great many of these facilities now. I believe in research, but I hope we don't overdo this. I suppose we have at least one research center in each State and some have as many as half a dozen now.

Mr. LOWREY. But they are not getting into the basic problems. They are getting into more the practical problems. We are particularly interested in the basic problems of water research as it affects the U.S. Forest Service, the Bureau, the engineers, which we just do not have the answer at the present time.

Thank you.

Senator KUCHEL. Thank you again, sir.

Two statements, one by Mr. Martin R. Huberty, director of University of California Water Resources Center and the other by the able assistant general manager of the County Supervisors' Association, Mr. Vincent Cooper will be set forth in the record in full.

(The statements referred to follow:)

STATEMENT BY MARTIN R. HUBERTY, DIRECTOR, THE UNIVERSITY OF CALIFORNIA WATER RESOURCES CENTER

This presentation is made pursuant to your invitation to appear at this meeting. The statement will be limited to a listing of the projects now under study by university staff members.

Two years ago there was created within the university a water resources center. Its function was to coordinate and encourage water research. Its budget is composed of two parts, one which permits the coordinating board to recommend distribution of funds to a wide range of projects, the other is a line item which is restricted to research on obtaining fresh water from sea water. Funds for these activities are provided by the State legislature.

A listing of projects carried out under the general program follows:

BERKELEY CAMPUS

Economic

1. Economic and institutional aspects of utilizing ground water.
2. The economics of public resource development with particular reference to multiple-purpose projects.
3. Economic growth and optimum water resource development.
4. Impact of irrigation on farm output in California.

Engineering

1. The effect of streamflow regulation on the supply of sand to beaches.
2. Biological desalinization and reclamation of water.
3. Electric analog models.
4. Subaqueous disposal of waste waters.
5. Ground water hydrology.
   (*a*) Seepage through river levees.
   (*b*) Salt water intrusion.
   (*c*) Development of ground water tracers.
6. Surface water hydrology.

Water resources center archives

Although organized on a statewide basis, this activity is headquartered in room 5 of the Mechanics Building on the Berkeley campus. It has as its objective the collection, inventorizing, and preservation of historical records of California's water resources and their development.

Law

1. Types of water contracts that might be entered into by the State.
2. Collection of legal material for a course in water law.

DAVIS

Agriculture

1. Adaptation of herbareous species of low water requirements and low fire hazard for watershed cover.
2. Mineral characteristics of water reaching the aquifer in ground water recharge.
3. Development of criteria for estimating crop water requirements for use in estimating crop water requirements.

4. Water quality in relation to infiltration rates, salt balance, and leaching requirements.
5. Salt removal by tile drainage.
6. The rate of approach to equilibrium between exchangeable ions and ionic constituents of irrigation water and soil solution.

Economics

1. Effect of onfarm irrigation supplies and costs on cropping systems and production adjustments.

Engineering

1. Effect of watershed management on water yield and erosion.
2. Small ponds in relation to watershed management.
3. Research in drainage.

LA JOLLA

Hydrology

1. Study of beach and nearshore sand transportation through the use of low level activity radioisotopes.
2. Isotopic variations in natural waters.
3. Studies of the history of pluvial lakes and climatic cycles in the California area by radiocarbon dating.

LOS ANGELES

Agricultural

1. Plant responses to salinity under different environmental conditions.

Economic

1. Program—Optimization of the utilization of a water resource.
2. Water distribution costs in selected municipalities.

Engineering

1. Waste water reclamation.
2. Hydraulics of unsteady flow.
3. Ground water hydrology, including recharge.
4. Drainage of agricultural lands.

Political

1. Study of the legal and administrative problems in the exchange of water supplies.

Meteorology

1. Quantitative forecasting of precipitation over southern California.

RIVERSIDE

1. Determination of leaching requirements.
2. Sodium toxicity as affected by sodium concentrations and sodium-calcium ratios.

SEA WATER CONVERSION RESEARCH PROGRAM

Some phases of this program have been active continuously since 1952. From the beginning Prof. Everett Howe has been the program leader. In July of last year additional funds were made available, permitting a substantial acceleration in the research program.

The objective of this program is to discover or develop one or more methods for obtaining fresh water frm sea water in large quantities and at low cost. "Large quantities" means amounts which would be of interest to irrigationists or municipalities. "Low cost" means costs competitive with normal water supplies.

Research is being carried out at Berkeley by the departments of engineering and chemical engineering, and on the Los Angeles campus by the department of engineering.

The present program includes the following projects:

BERKELEY

1. Solar distillation.
2. Vacuum flask distillation.
3. Energy relations in vapor compression distillation.
4. Ultra filtration.

5. Use of magnetic elements in scale control.
6. Ion exchange.
7. Analysis of the proposal to use underground nuclear explosions for distillation.
8. Use of algae for demineralizing water.
9. Use of low thermal reactors as a source of heat for distillation.
10. Use of rotating heat transfer surfaces to improve the efficiency of distillation.
11. Freezing experiments.
12. Electrodialysis studies.

LOS ANGELES

1. Reversed osmosis.
2. Flash distillation (analytical studies).
3. Skimming processes.
4. Measurement of thermodynamic properties of sea water and sodium chloride.
5. Heat transfer studies.
6. Spray phenomena.
7. Studies of the use of organisms in salt removal.

Support of water research in addition to water resources center funds

While the projects listed above cover most of the areas on water being studied by the university, the funds provided by the water resources center by no means represents the university's total contribution. As the university provides practically all the research staff and facilities it would be safe to say that this additional support would amount to a million dollars a year.

In addition to the studies directly supported by university funds, there have been some from Resources for the Future, the National Science Foundation, and the U.S. Public Health.

The center has issued some twoscore reports. Insofar as they are available, we would be pleased to provide your committee with a collection of these reports.

STATEMENT BY VINCENT T. COOPER, ASSISTANT GENERAL MANAGER OF THE COUNTY SUPERVISORS ASSOCIATION OF CALIFORNIA

My name is Vincent T. Cooper, assistant general manager of the County Supervisors Association of California, and I am submitting this statement on behalf of William R. MacDougall, our general counsel and manager, who is in Washington, D.C.

This is in response to a request by Senator Clair Engle. We hope this brief sketch of the part California counties have and are playing toward the ultimate development of all of the water resources in California will be helpful to the committee.

We feel that the spirit of cooperation found in California with all governmental levels, Federal-State-local, participating together may be of interest to this important Senate fact-finding committee studying our water program.

We are proud to inform the committee of the tremendous effort our counties have, and are exerting toward solution of our water complex.

When Roger Jessup became president of the County Supervisors Association of California in 1953, one of his first actions was to create a brandnew committee to deal solely with water problems, along with an advisory committee to assist the committee of supervisors in their deliberations.

C. W. Bradbury, of Santa Barbara County, was selected as chairman at that time, a post he has held continuously. He was promoted to the high office of president of the association at our annual meeting this year held in September at San Jose, Calif.

The first goal of the association was to establish a State department of water resources. Our association, together with eight other statewide associations, joined hands to achieve this objective. The other associations were as follows: Agricultural Council of California, California Central Valleys Flood Control Association, California Farm Bureau Federation, California State Chamber of Commerce, Irrigation Districts Association of California, League of California Cities, California Municipal Utilities Association, and California Soil Conservation Districts Association.

These organizations, under the leadership of Mr. Bradbury, and after 3 years of effort, succeeded in the creation of a State department of water resources during the special session of the legislature in 1956.

Since that time county supervisors have worked in close partnership with the new department of water resources and the California Water Commission, endorsing their 11-point statement of principles for the development of California's water resources on a firm continuing basis.

The 1959 session of the California Legislature, cooperating with the administration under the dynamic leadership of Edmund G. Brown, Governor of the State of California, accomplished most of the objectives desired by our association which included the creation of the California Water Fund; adoption of the California Water Plan as a general guide; extension of exemptions from due diligence to 1963; assistance for local projects; authorized options to purchase lands for recreational purposes; appropriated 74.4 millions of dollars for actual water project construction; established a permanent state policy for assistance to local government covering future major flood disasters; increased the membership of the California Water Commission from seven to nine members; strengthened the State Water Pollution Control Act; provided for the consideration of seepage and erosion damages in water project planning; authorized a bond issue of $1¾ billion which is scheduled to appear on the 1960 ballot; required hearings by the California Water Commission on applications to appropriate water and notices of hearings to boards of supervisors to present views and objections to the proposed action; required transfers of State water filings to the California Water Commission to be held by the Water Commission rather than the Department of Water Resources for assignment or release by priority of commission.

The creation of the California Department of Water Resources in 1956 together with the legislative achievements in 1959 does not mean that we may now relax and claim that all problems have been solved.

Our association is now in the process of examining the essential provisions of the 1960 bond act and will study the form of the contracts which will be drawn to implement the bond act if adopted by the people in 1960. We are also studying the methods through which the various local flood control districts and water agencies may best tie in to the State water program. Several of our counties have already contracted with the Bureau of Reclamation for the distribution of water created through Federal participation in local water projects.

Our association participates actively in the California Flood Control Conference and with the California Water Commission in preparing the annual requests to Congress for approval of California flood control projects.

We wish to commend the committee and our Senators, Thomas Kuchel and Clair Engle, for holding this hearing which indicates the interest of the Federal Government in the water problems of California and its political subdivisions.

Senator KUCHEL. The next witness is the distinguished Californian the committee will be most pleased to hear, Mr. John Reber of San Francisco.

Mr. REBER. Senator, I had written Senator Kerr, asking to appear this afternoon rather than this morning.

Senator KUCHEL. Very well.

Mr. REBER. I have a few maps I want to get up there.

Senator KUCHEL. Very well.

We will next hear from Mr. Clair Hill of Redding.

Is Mrs. Johannes van Overbeek of the League of Women Voters here?

We have been listening to representatives of your organization across the country. They have contributed handsomely to our record. We are glad to have people from our State now participate.

STATEMENT OF MRS. JOHANNES VAN OVERBEEK, LEGISLATIVE WATER CONSULTANT, LEAGUE OF WOMEN VOTERS OF CALIFORNIA

Mrs. VAN OBERBEEK. Thank you, Senator. I hope I can live up to that standard.

I am Thelma van Overbeek. I am the Legislative Water Consultant of the League of Women Voters of California.

I want you to know that the league appreciates this opportunity to acquaint you with our views.

I think it would interest the members of the committee to know that more than 10,000 League members throughout California, housewives and working women—are being invited this month and next to meet and discuss some of the fundamental questions posed by State development of California's water resources. These women are prepared to explore what policies the State might best pursue in a water program because for the past 3 years they have been studying and discussing some of the problems and precedents in national water resources development. League members know that the Central Valley project is a wonderful example of the value to the State of Federal development and the benefits that accrue from a farsighted and imaginative water development program. However, they are also aware that California's King River provides a classic example of some of the problems which arise from lack of coordination among Federal agencies involved in water resource development.

In the course of our league study last year, we determined to find answers from experts for some of the questions in water resource development, very much like those this committee is considering. To this end we interviewed 25 outstanding men including California's own distinguished Senators, State legislators from Trinity County to San Diego, economists, engineers, representatives of Federal, State, and local water agencies, and political scientists. A list of those interviewed is appended to this statement.

The first question we asked was, "Do you believe that additional water is very shortly necessary for southern California, and, if so, are there any practical alternatives to importation of water from northern California?"

All the experts, with one exception, agreed that southern California needs water within 10 to 26 years if the present population trends continue. One of our State Senators noted that in all the State legislature's hearings, no expert would guarantee that saline conver-

sion will be economically competitive with other sources of water by 1975, as has been suggested. A large majority believed there were no practical alternatives to importation of water from the north.

When we asked our experts if the State of California should construct water projects, the majority answered that the State should contruct water projects, otherwise water supply could not keep up with the population growth. They believed that the Federal Government would not spend enough money in the State to do this and that the local governments were simply not able to do so.

These are the questions which may be of most interest to you. "Is it likely that the Federal water agencies will coordinate their programs with the overall California water plan? Can we have Federal contributions without Federal control? Can the State exercise control? Or is some new type of coordinating machinery between Federal and State Governments necessary?" The general opinion expressed was that there is good coordination between the Corps of Engineers, the Bureau of Reclamation and the State department of water resources. The consensus was that we would have some measure of Federal control following Federal contributions, but, on the whole, the experts were optimistic that the State could exercise fundamental control over its projects. They did not see a need for new governmental machinery to insure coordination between Federal and State governments in this respect.

The League of Women Voters of California has not yet completed its study of Federal and State water development in California, but our members have been studying and discussing the material I have just cited to you, in addition to many, many other references and materials.

At this time, league members are agreed that, in California's unique situation, the State is the logical agency of government to provide for systematic and effective cooperation among Federal, State, local, and private interests in the formulation and administration of a statewide water program. The needs of California's expanding economy for municipal and industrial water are such that State development is a necessity; Federal and local development have not been able to keep pace with the demand. The contribution of economic well-being of this State to the welfare of the Nation is obvious and is dependent on an adequate water supply for California's cities, factories and farms. But State development of California's water resources is only realistically possible if it is supplemental to continuing Federal, local, and private development. For this reason it is very necessary that California continue to enjoy Federal aid and support, as well as local development, because without them a State water program is not feasible.

California league members have not yet decided if the Burns-Porter Act is the answer to our State's water problem but they would agree that resource issues are essentially political. The final decisions about the Government's role in resource development have to be made in the political forum. With this in mind the League of Women Voters of the United States, as well as in California, of course, is supporting Senate bill 2549 introduced by Senator Murray and his colleagues, many of them members of this committee, which would declare a national policy on conservation, development and utilization

of natural resources. We believe that it can be a step toward what Senator Murray describes as a "permanent mechanism in Government that will give continuous attention to the entire range of natural resources, and that will periodically advise the President and the Congress what is needed and how to attain it."

League members believe that the proceedings of your committee and the changes in national water policies which may result from your recommendations are especially important to every Californian.

Senator KUCHEL. Thank you very much, Mrs. van Overbeek, for an excellent statement and also for the most laudable interest which your great organization, the League of Women Voters, not only in the State but across the country, takes in the problems of water and in the work of this committee.

Are there any questions, gentlemen?

Mrs. VAN OVERBEEK. Thank you.

Senator YOUNG. I think you have lived up to the reputation of the League of Women Voters.

Mrs. VAN OVERBEEK. Thank you, Senator Young.

(The list referred to follows:)

The men interviewed and the leagues that conducted the interviews in which many neighboring leagues participated are:

Assemblyman CASPER WEINBERGER, author of legislation creating the State department of water resources, interviewed by the League of Women Voters of San Francisco.

Senator CLAIR ENGLE, author of Central Valley project legislation, and chairman, House Committee on Interior and Insular Affairs, interviewed by mail.

State Senator EDWIN J. REGAN, of Trinity County (northern California) interviewed by League of Women Voters of Eureka.

ROBERT T. DURROW, secretary-treasurer of Irrigation Districts Association, interviewed by League of Women Voters of San Francisco.

Senator THOMAS KUCHEL, author of San Luis legislation, interviewed by mail.

HARVEY O. BANKS, director, State department of water resources, interviewed by the League of Women Voters of Sacramento.

JAMES C. DEHAVEN, economist at Rand Corp., Santa Monica, author of articles on the economics of California's water supply, interviewed by the League of Women Voters of Santa Monica.

JEROME MILLIMAN, professor of agricultural economics at UCLA, interviewed by League of Women Voters of Los Angeles.

MAX BOOKMAN, district engineer, California Department of Water Resources, interviewed by the League of Women Voters of Los Angeles.

B. P. BELLPORT, Regional Director, U.S. Bureau of Reclamation, interviewed by the League of Women Voters of Sacramento.

JUSTIN A. MACE, Technical Information Branch, South Pacific Division, U.S. Corps of Engineers, interviewed by League of Women Voters of Oakland.

State Senator HUGH M. BURNS, president pro tempore of State senate, interviewed by the League of Women Voters of Fresno.

State Senator RICHARD RICHARDS, chairman of joint legislative amendment drafting subcommittee, interviewed by the League of Women Voters of Arcadia.

WARREN W. BUTLER, vice chairman of the board of directors of the metropolitan water district, interviewed by the League of Women Voters of Palos Verdes.

SAMUEL MORRIS, consulting engineer, vice president Feather River Project Association, interviewed by the League of Women Voters of South Pasadena.

MERRILL GOODALL, political scientist, Claremont graduate school, interviewed by the League of Women Voters of Claremont.

Assemblyman CARLEY PORTER, chairman of subcommittee on economic and financial policies for State water projects, interviewed by the League of Women Voters of Inglewood.

MARTIN HUBERTY, professor and director, University of California Water Research Center, interviewed by the League of Women Voters of Pasadena.

J. W. McFARLAND, manager, East Bay Municipal Utility District, interviewed by League of Women Voters of Berkeley.
STATE SENATOR KRAFT and STATE SENATOR HUGO FISHER, of San Diego County, interviewed by the League of Women Voters of San Diego.
STATE SENATOR JAMES COBEY, of Merced County, interviewed by the League of Women Voters of Merced.
ELMER B. WOOD, president, Irrigation Districts Association, interviewed by the League of Women Voters of Merced.
HUBERT MARSHALL, professor, political science at Stanford University, interviewed by the League of Women Voters of Palo Alto.
ALBERT LEPAWSKY, professor, political science at University of California (Berkeley) interviewed by the League of Women Voters of Richmond.

Senator KUCHEL. Mr. Ray Hunter, director of natural resources of the California Farm Bureau Federation.

STATEMENT OF RAY HUNTER, DIRECTOR OF NATURAL RESOURCES OF THE CALIFORNIA FARM BUREAU FEDERATION

Mr. HUNTER. Senator Kuchel, Senator Kerr, Senator Young, Senator Engle:

I wish to thank you for this opportunity of appearing here and presenting the views of the California Farm Bureau Federation.

I am Ray Hunter, director of natural resources for the California Farm Bureau Federation, which is a general farm organization representing more than 65,000 farm and ranch families of California, with headquarters at 2223 Fulton Street, Berkeley, Calif.

I wish to present the views of the California Farm Bureau Federation based on the policy of our organization as developed by the membership and adopted by our house of delegates, made up of representatives of each county farm bureau in the State.

Since the California Department of Water Resources and other State and Federal agencies concerned with water development in California has and will no doubt furnish the committee with the best factual information available based on engineering and economic studies, investigations, and estimates as to the extent and character of water resource activities and needs to meet the requirements of all classes of water users through 1980, we will confine our statement largely to policies which, we believe, should be the general guides for establishing the proper relationship between Federal, State, and local agencies and private interests in future water resource development.

At the last annual meeting of the California Farm Bureau Federation, our house of delegates adopted the following resolutions:

FEDERAL-STATE RELATIONS IN WATER PROJECT DEVELOPMENT

We favor the maximum participation of individuals, local agencies and local and State government in the development of water projects. Federal participation in water development should preferably be in cooperation with State and local interests. We are opposed to Federal domination and control of water resource development.

Water rights established by State law and State laws relating to the use of water should be respected by Federal agencies. We urge the enactment by Congress of legislation to provide this.

The increasing needs of the people of the United States for flood control, water conservation, and distribution are of serious concern to

the public and, in some areas have reached urgent proportions. Maximum cooperation between agencies of the State and Federal Governments will be required to meet these needs.

When it is desirable that cooperation and coordination of operations exist between the State and Federal Governments in development of water resources of the State, the State-Federal relationship should be clearly stated by contract. Such contracts should provide for the affected State project to store and transfer water, through use of its facilities, for ultimate delivery through facilities of the affected Federal propect; and in appropriate instances for the Federal project to store and transfer water, through use of its facilities, for ultimate delivery through facilities of the State project.

In the event facilities of the State project are of service to the Federal project, the United States should pay an appropriate share of the costs, including capital costs, on a proportionate basis consistent with other deliveries of the State project. In the event the facilities of the Federal project are of service to the State project, the State should pay an appropriate share of costs, including capital costs, on a proportionate use basis, consistent with other deliveries of the Federal project.

The rendering of such reciprocal service by a Federal project to a State project should not subject the State project's water deliveries to Federal laws restricting the use of water. The State should exercise control with respect to the determination and administration of the right to the use of water.

Water rights of individuals must be inviolate. We are opposed to encroachment by the Federal Government into vested water rights, and to the development of Federal water projects not in compliance with State law.

Right here I would like to commend both our honorable Senators from California for the good work that they did during the 1st session of the 86th Congress for trying to write these basic policies into the San Luis legislation which would provide for this kind of relationship between the Federal Government and the State. We thank you for that.

The other resolution has to do with acreage limitation.

We oppose any efforts to establish acreage limitations on the use of water developed by the State of California and made available to agriculture.

Acreage limitations should be eliminated on Federal projects supplying water where the lands are largely, or entirely, privately owned and farmed or have existing water rights.

Acreage limitations, when applied to delivery of water to water users in California work both an injustice and a fraud on small and large landowners alike, as well as the public.

Such limitation tends to place the burden of costs for conservation and importation of supplemental water on the small landowner.

Economic and profitable production of crops often requires different acreages in different areas, as soil and climatic conditions vary. Thus, an effort to apply acreage limitations uniformly over the country is economically unsound and unworkable.

As a requirement in the development of public lands, acreage limitations, now in effect under Federal Reclamation law originated in

1902 as a carryover from the homestead law. Conditions have almost completely changed, especially in California, and limitations are not properly or fairly applicable to lands or water deliveries in California, where lands to be irrigated are practically all held in private ownership. It tends to promote unfair discrimination which adversely affects all water users and the public.

It deters and prevents cooperation among all water users in development of water resources and induces serious delay in such development.

I might point out here that without the impediment of acreage limitations, districts of California, of which there are some 114, have successfully defended and made water available for agricultural use.

Almost two-thirds of the 20 million acre-feet of water which has been testified to date in the State have been developed by these districts.

I am sure that all members of this committee are, undoubtedly, aware of court decisions and other things that have happened over the past several years which have resulted in casting an ominous cloud over the integrity of State water laws and the water rights of individuals acquired under State law. This has happened in the face of no less than 30 statutes enacted by Congress since 1866, which recognize the primacy of State law in this field.

Attaced to this statement you will find an outline map and a step chart which gives several examples of court decisions and claims that have been made by the Justice Department of the United States which tend to have created this cloud which is hanging over the status of State water law.

Practically everyone who has really studied the water rights situation agrees that special congressional action is needed on Federal legislation which will clearly and without question of misinterpretation dispel the ominous cloud over the status of State water law and settle the controversy which now exists regarding this matter. Such action should be taken at the earliest possible date.

We believe that such legislation should include the following principles:

1. That the authority of State governments to regulate the use of water flowing from it through "reserved" or withdrawn Federal lands should be the same as the authority of State Governments to regulate the use of water from other Federal lands.

2. That Federal Power Commission licensees should be required to comply with State law relating to the use of water in navigable streams, provided, of course, that the Congress may determine otherwise in specific cases.

3. That Federal agencies responsible for the administration of Federal projects should comply with applicable State law and procedures for the purpose of obtaining rights to the use of water, subject, of course, to the Federal navigational power where applicable.

4. That where a Federal agency takes an action which damages rights of present owners, such agency should purchase or condemn such rights with due process and payment of just compensation.

5. That where private rights have been validly established under State law in the waters of a navigable stream, individuals, businesses, or communities whose rights are diminished as a result of Federal action shall be entitled to just compensation.

6. Provide for the elimination of acreage limitations in connection with Federal water projects supplying supplemental water to lands largely privately owned and already producing agricultural products.

This leaves unsettled, or leaves to the courts, the definition of a navigable river. It would be desirable for Congress to define navigability. At some point between the mouth and headwaters of a river, navigability should be considered to cease. It would appear to be desirable that this problem on the subject of congressional study and investigations, perhaps by this committee.

Bills were introduced during the 1st session of the 86th Congress which, if enacted, would accomplish most of the principles listed above.

They are S. 1416 by Senators Frank E. Moss of Utah, coauthored by Frank Case of South Dakota, and I understand that Senators Moss and Case are members of this 17-man committee, and also H.R. 5555 by Congressman Rogers of Texas.

Resolutions were adopted by the legislatures of 19 States during 1959 sessions, including California, memorializing Congress to enact such legislation.

I have attached also as the last sheet of this statement an outline map of the United States showing those 19 States whose legislatures took such action in 1959.

We here in California are embarking on a State water development program to meet the rapidly expanding needs of all water users in our fast growing State. This program will run into an investment of billions of dollars by the water users of California. This program is essential if the needs of our people are met. If such programs are to be successful, if States are to be encouraged to undertake such development to the maximum of their respective abilities to the relief of demands for huge Federal expenditures, and if the resulting beneficial impact on our national economy is to be realized, Congress must establish national water policies which will remove the clouds that presently hang over the water laws of the States and provide the needed security and protection to the citizens of the State who are willing to invest their own money in and completely finance, except for appropriately allocated Federal flood control, navigation and wildlife benefits, State and local water projects.

Agriculture has a great interest in water resource development and all other interests should recognize the absolute essentiality that agriculture is adequately served in future water resource development, if our total economy is to continue to expand and prosper. If agriculture is hamstrung by arbitrary limitations which work adversely to improved production techniques and efficiency, agriculture will suffer and the total economy will likewise suffer.

Recent studies show that agriculture has a tremendous effect nationally on our total economy. They show that when the total input into the "agricultural plant" from steel products, fuels, fertilizers, lumber, transportation, and so forth, is considered along with the plant itself and the total output and the resultant effect on processing, manufacturing, retailing, transportation, and like industries (agribusiness is the term used to embrace this concept) this agribusiness industry produces values nearly twice that of all other manufactured products. It accounts for 40 percent of consumer expenditures and employs 37

percent of the total labor force. The controlling point of this agribusiness industry is the agricultural plant itself, because the size of that plant will determine the input and the output.

It is therefore easy to understand that agriculture must not be subjected to arbitrary limitations which tend to limit the use of the more efficient production techniques if the agribusiness economy is to contribute the maximum to the prosperity of our total national economy.

I wish to thank the committee for the opportunity to present this statement on this most important matter of national importance, in what we feel is one of the most important matters nationally and to our State.

Thank you.

(The charts referred to follow:)

CHART 1.—OUTLINE MAP

All states except those cross-hatched were carved from public domain lands and would be subject to the claim of the U.S. Justice Department that the title to the water did not pass from the U.S. to the various states when those states were formed.

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CHART 2.—STEPS TOWARD COMPLETE FEDERAL OWNERSHIP AND CONTROL OF OUR WATER RESOURCES

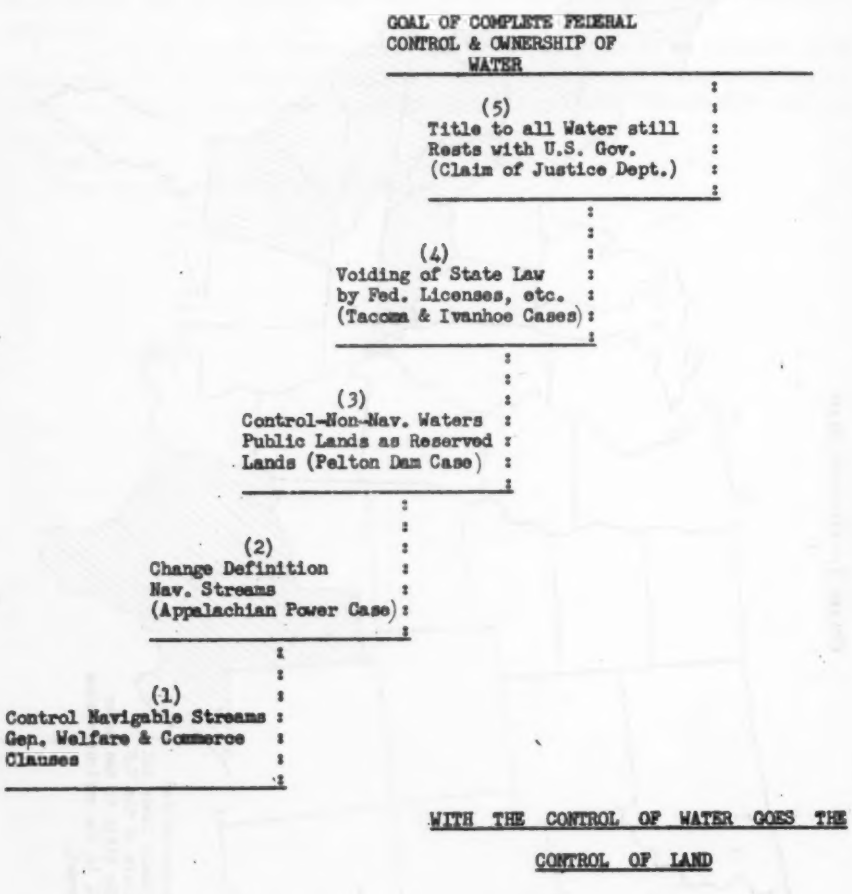
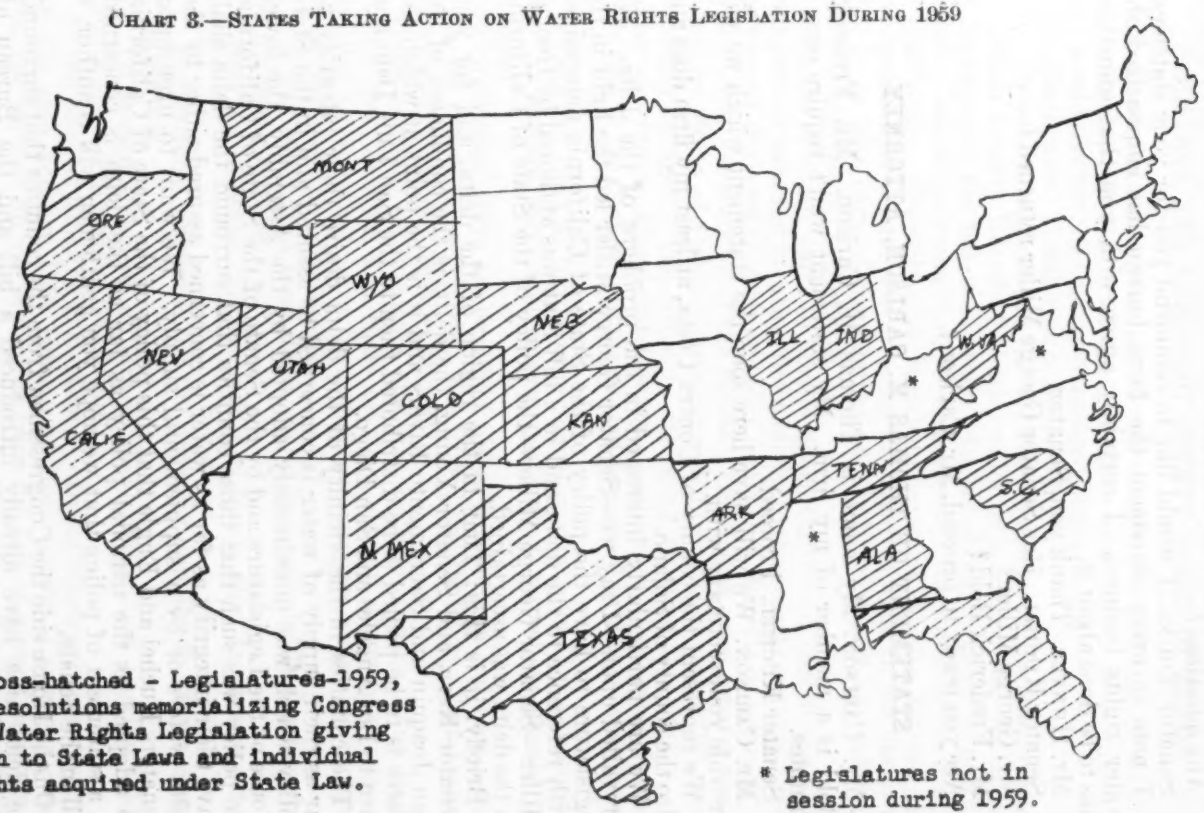

CONTROL OF OUR WATER RESOURCES
GOAL OF COMPLETE FEDERAL CONTROL & OWNERSHIP OF WATER
(5) Title to all Water still Rests with U.S. Gov. (Claim of Justice Dept.)
(4) Voiding of State Law by Fed. Licenses, etc. (Taccma & Ivanhoe Cases)
(3) Control-Non-Nav. Waters Public Lands as Reserved Lands (Pelton Dam Case)
(2) Change Definition Nav. Streams (Appalachian Power Case)
(1) Control Navigable Streams Gen. Welfare & Commerce Clauses
WITH THE CONTROL OF WATER GOES THE CONTROL OF LAND

CHART 3.—STATES TAKING ACTION ON WATER RIGHTS LEGISLATION DURING 1959



States cross-hatched - Legislatures-1959, adopted resolutions memorializing Congress to enact Water Rights Legislation giving protection to State Laws and individual water rights acquired under State Law.

* Legislatures not in session during 1959.

Mr. HUNTER. Thank you very much.

Any questions?

Senator YOUNG. I would like to commend you for your statement.

I note in every statement the farm bureau has emphasized this water rights business. I certainly agree with you that something has to be done about it.

Mr. HUNTER. Thank you, Senator.

Senator KUCHEL. Has Senator George Miller returned?

Mr. George Miller?

Mr. Frederick Bold?

Are you ready to proceed, Mr. Carlson?

STATEMENT OF THOMAS M. CARLSON, ATTORNEY

Mr. CARLSON. My name is Thomas M. Carlson. Mr. Frederick Bold is a member of my firm. My statement won't require over 3 minutes.

Senator KUCHEL. Proceed.

Mr. CARLSON. We will have here soon the statement which we will provide your secretary with.

We represent the county of Contra Costa, at least my firm does and also the county of Solano.

We are particularly interested in the problems of the delta. We prevailed upon—I say we—Senator George Miller led the fight in the legislature to have the policy of the State of California determined with reference to the delta and in a bill that was authored by George Miller—Senator George Miller—the policy of the State of California in the delta was ascertained.

Briefly, it is this: That in the region of the delta, and for you, Senator Kerr, and Senator Young, the delta is the confluence of the San Joaquin and Sacramento Rivers and it is the point at which the water is to be pooled to be distributed then to the San Luis Dam and then to Los Angeles and San Diego.

The counties in the vicinity of the delta desire their integrity as far as their supply of water is concerned be assured and in the State policy which was unanimously adopted by the Assembly, the lower House of the Legislature and by the Senate of the State of California, the policy was such that those counties that surround the delta shall have their integrity as far as water is concerned assured either by the delta waters or by a supplemental supply. We want to urge upon Senators Kuchel and Engle that this policy of the State of California be adopted as the national policy as far as the delta is concerned in a statement of policy that we hope you gentlemen will coauthor, a bill in the Senate.

On the House side the Congressmen from the counties that surround the delta area have already introduced a bill and the Bureau of Reclamation is making some sort of an investigation.

Thank you.

Senator KUCHEL. Thank you very much, Mr. Carlson.

I asked for Mr. Denbo. He is not present?

Mr. DENBO. Right with you.

Senator KUCHEL. Come in, if you please, sir.

STATEMENT OF R. F. DENBO, MANAGER, EUREKA CHAMBER OF COMMERCE AND HUMBOLDT COUNTY BOARD OF TRADE

Mr. DENBO. Senator Kuchel, members of the committee, I would like to summarize the brief that we have and take 2 or 3 minutes but I would like for the brief to be entered in the record.

The CHAIRMAN. Thank you, and it will be.

Mr. DENBO. I represented the Eureka Chamber of Commerce and Humboldt County Board of Trade, which is sponsored by the board of supervisors, the board of trade. In Humboldt County in northwestern California we have about 40 percent of the water of the State of California. Recently, the Humboldt area of Eureka formed its own water district and will proceed this year of 1960 to put its own dam in to take care of commercial and industrial and agricultural waters that is needed in that area.

We have so much water in northwestern California that it actually runs out our ears and is rather devastating to the coastal counties. In the year of 1955 and 1956 Humboldt County lost, directly or indirectly, $100 million on account of the floods. Our losses were greater than the entire State of California combined during that year. We lost 49 county bridges. The last ones are being replaced this year.

Our tax rate in Humboldt County, I believe, is the highest in the State due to the devastating floods that happened in that mountainous area.

We are for the California water development plan if it is inaugurated in certain ways and certain parts of it we believe should be changed.

In conclusion, there are excellent places in northern California for dams on the Calamatt River, Eel River, Smith River, Van Duzen River, and Redwood Creek, et cetera.

These locations include such places as Dollison and Lacks on Redwood Creek, Jackson and Slate on the Calamatt River, plus others familiar to you that have been surveyed in past years by various departments of the Government.

It is our belief that these dams would be economically feasible for the following reasons:

1. Storage of water for areas in California that are hungry for water.

2. Recreational purposes for the growing population of the State of California.

3. To save millions of dollars in flood devastation to Humboldt County and northwestern California.

At the present time the U.S. Army Corps of Engineers are surveying the area and the U.S. Bureau of Reclamation is surveying the area, but surveys do not protect us from the loss of ground and property during the flooded seasons when water runs off very quickly in the mountainous area along the coast.

So, therefore, Humboldt County and northwestern California should be given protection and assurance that it will now and forever have the water that it needs. But it is also our contention that the State and Federal Governments should both participate in these projects for the benefit of California as well as the entire Nation. We believe that some plan should be made whereby all of California would

share not only in the cost of these projects but would also share in the benefits.

Thank you very much.

Senator YOUNG. Thank you, Mr. Denbo.

STATEMENT OF R. F. DENBO, MANAGER, EUREKA CHAMBER OF COMMERCE AND HUMBOLDT COUNTY BOARD OF TRADE

1. GEOGRAPHICAL LOCATION OF HUMBOLDT COUNTY

The county of Humboldt, Calif., is located in the northwestern part of the State, bounded on the north by Del Norte County, on the south by Mendocino County, on the west by the Pacific Ocean, and on the east by Trinity and Siskiyou Counties. It is 203 miles north of San Francisco, Calif., on U.S. Highway 101, known as the Redwood Highway.

2. CLIMATIC DATA OF HUMBOLDT COUNTY

The climate of Eureka, Humboldt County, Calif., is maritime with moderate temperatures the entire year. High humidity prevails and an average of 40 inches of precipitation falls yearly.

3. TOPOGRAPHY OF HUMBOLDT COUNTY

For the greater part, the terrain of Humboldt County is rugged and mountainous with elevations ranging from sea level to 6,934 feet. Parallel spurs of the coast range trend northwestward through central and southern Humboldt County and are drained by the Mattole, Bear, Eel, and Mad Rivers. Northern Humboldt County contains spurs of the Klamath Mountains and are drained by Redwood Creek, the Trinity, and Klamath Rivers.

4. POPULATION OF HUMBOLDT AND DEL NORTE COUNTIES

For population growth of Humboldt and Del Norte Counties, see exhibits A and B.

Eureka proper had a population, according to the 1950 census, of 22,962. A special 1956 census showed a population of 27,951 within the city limits of Eureka. The chamber of commerce estimates the city's present population at 30,000.

5. LAND USE OF HUMBOLDT COUNTY

Humboldt County has an area of 2,286,720 acres or 3,634 square miles, equaling the combined areas of two States—Delaware and Rhode Island. Of the county's 2,286,720 acres of land, 85 percent is covered by timber, or 1,740,000 acres. There are 858,515 acres of farmland, which is 37.5 percent of the total land area.

6. AGRICULTURE

Agriculture is one of Humboldt County's base industries. Humboldt's moist, cool, moderate climate is ideal for many types of agriculture. The county has an inexhaustible supply of fresh water for irrigation.

7. FLOOD CONTROL

Humboldt County certainly wants to protect its own watersheds. However, the county has a surplus of water. During the 1955 and 1956 floods, Humboldt County lost, directly and indirectly, $100 million in private and public property including 49 county bridges. This has caused our county tax rate to be one of the highest in the entire State of California. However, this year the problem is almost solved and our tax rate has decreased slightly. Therefore, it becomes essential that Humboldt County endeavors to protect itself from devastating and costly floods as quickly as possible.

8. RECREATIONAL DEVELOPMENT

Recreation is recognized as an extremely valuable asset in Humboldt County which is so richly endowed with natural recreation features. It is realized that there must be proper development of these recreational features. There are

800 miles of fishing streams in the county. Sports fishing provides approximately $3 million a year to the basic economy of the county. Construction of the Ruth Dam on Mad River will provide not only industrial water and water for the cities of Eureka and Arcata, but will also provide a natural recreation area for development of water sports and fishing. The U.S. Forest Service is now underway with a master recreation plan for this project. With proper development, the potential of the entire recreation industry in Humboldt County is great. It is a recognized fact that in future years the economy of this north-coast area will become more dependent on the recreation industry.

9. RIVER AND STREAMFLOW OF HUMBOLDT COUNTY

According to the U.S. Department of Interior, Bureau of Reclamation, region 2, Humboldt County has a total estimated average yearly streamflow of 16,692,300 acre-feet of water. (See exhibit C.)

10. PRESENT AND FUTURE WATER REQUIREMENTS

The local office of the Bureau of Reclamation estimates the county's present water use at 75,000 acre-feet a year. An analysis of that Bureau shows that the region will require 300,000 to 400,000 acre-feet within 40 to 50 years from now, and not too long ahead of that 1 million acre-feet will be required. The analysis also showed that, from Table Bluff to Trinidad in Humboldt County resides approximately 40 percent of the present population and a major part of the industry of the county. About 15,000 acre-feet of water is now used each year in this area. The city of Eureka uses 4,000 acre-feet a year and Arcata uses 1,000 acre-feet yearly. The Bureau of Reclamation analysis indicates that within 40 to 50 years the demand for this area will rise to 100,000 acre-feet if all of the land is irrigated and there is an increase in the utilization of timber production above the yield. However, it is the chamber's estimate that this figure may easily be doubled with the full and proper utilization of our forest products.

11. INDUSTRIAL DEVELOPMENT

In the year 1956, the people of Humboldt County formed the Humboldt Bay Municipal Water District under the California Municipal Water Act of 1911. They passed a bond issue for $12 million. Directors were elected. Construction of a dam is to be started in the early part of 1960. Expenses to date, such as engineering and surveying costs, etc., have been paid by the interested companies and the Eureka Chamber of Commerce.

Two $30 million pulp plants will be completed on the Samoa Peninsula, Humboldt County, Calif., by July 1, 1962. One pulp mill will be constructed for the Georgia-Pacific Corp. and the other for Simpson Redwood Co. Each of these two companies has signed contracts with the Humboldt Bay Municipal Water District for delivery of 8 million gallons of water per day in July 1962. Two years after the delivery of water begins, each company has asked for 12.5 million gallons of water daily. As these two companies expand, there will be a need for additional quantities of water. A third or fourth plant will automatically raise the consumption of water many millions of gallons in the Humboldt Bay area.

Development of the Mad River is to begin next March 1960. This development will include a 131-foot dam at Ruth, Calif., a 1,150-acre reservoir, a diversion dam and pumping station, plus a 9- or 10-mile 42-inch pipeline to the Samoa Peninsula. The first stage of construction will be a reservoir to hold 42,000 acre-feet of water, enough for delivery of 75 million gallons daily which would supply three pulp mills in addition to domestic needs of the Humboldt Bay area. It is estimated that construction of the two proposed pulp mills will add about $18 to $20 million assessed valuation to the country. It will also start the utilization of water that is now flowing into the ocean and lumber waste and residue that is now being burned.

12. CONCLUSIONS

In Humboldt County and northwestern California there are excellent locations for dams on the Klamath River, Eel River, Mad River, Smith River, Van Duzen River, and Redwood Creek, etc. These locations include such places as Dollison and Lacks on Redwood Creek, Jackman and Slate on the Klamath River, plus others familiar to you that have been surveyed in past years by various depart-

ments of the Government. It is our belief that these dams would be economically feasible for the following reasons:

A. Storage of water for areas in California that are hungry for water.

B. Recreational purposes for the growing population of the State of California.

C. To save millions of dollars in flood devastation to Humboldt County and northwestern California.

Humboldt County and northwestern California should be given protection and assurance that it will now and forever have the water that it needs. It is our contention that the State and Federal Government should both participate in these projects for the benefit of California as well as the entire Nation. We further believe that some plan should be made whereby all of California would share not only in the cost of these projects but also in the benefits. Thank you.

EXHIBIT A

Population growth of Humboldt County, Calif.

Year	Population	Percent increase
1880	15,512	------
1890	23,464	51.26
1900	27,104	11.25
1910	33,857	24.91
1920	37,413	10.50
1930	43,233	15.55
1940	45,812	5.96
1950	69,241	53.32
1955 (California Taxpayers Association estimate, Jan. 1)	87,160	------
1958 (California Taxpayers Association estimate, Jan. 1)	96,900	------
1959 (Department of finance estimate, July 1)	100,200	44.74

EXHIBIT B

Population growth of Del Norte County, Calif.

Year	Population	Percent increase
1900	2,408	------
1910	2,417	0.37
1920	2,759	14.14
1930	4,739	71.74
1940	4,745	.12
1950	8,078	70.24
1955 (California Taxpayers Association estimate, Jan. 1)	15,440	------
1958 (California Blue Book, estimate, July 1)	19,100	------
1959 (Department of finance estimate, July 1)	20,100	148.83

EXHIBIT C

Streamflow of Humboldt County, Calif.

PRINCIPAL HUMBOLDT COUNTY STREAMS AVERAGE STREAMFLOW FOR PERIOD 1920-21 THROUGH 1951-52

[In acre-feet]

Month	Mattole River near Petrolia	South Fork Eel River near Miranda	Eel River at Scotia	Van Duzen River near Bridgeville	Mad River near Arcata
October	9,000	12,100	39,800	6,800	8,500
November	52,700	69,500	284,000	36,000	56,900
December	124,400	186,400	788,000	87,300	139,600
January	144,700	220,100	936,100	96,700	168,600
February	159,900	249,000	1,088,000	110,400	199,700
March	113,300	170,400	757,300	82,700	151,400
April	66,000	103,100	506,100	57,800	111,500
May	26,700	40,500	204,000	25,100	57,700
June	11,100	16,400	69,900	8,500	19,300
July	4,400	5,900	19,000	2,000	4,800
August	2,100	3,000	7,900	700	1,800
September	1,600	2,200	5,800	500	1,200
Total	715,900	1,078,600	4,705,900	514,500	921,000

Source: U.S. Department of Interior, Bureau of Reclamation region 2, Eureka Development Field Branch, Vernon J. Hansen, Chief, Eureka, Humboldt County, Calif.

Streamflow of Humboldt County, Calif.—Continued

[In acre-feet]

Month	Little River at Crannell	Redwood Creek at Orick	Trinity River near Hoopa	Klamath River near Klamath
October	800	9,200	45,900	205,700
November	4,500	43,000	149,700	538,000
December	11,200	102,000	327,000	1,006,100
January	13,700	123,000	382,000	1,152,700
February	16,300	145,000	478,900	1,420,400
March	12,100	110,000	447,900	1,352,000
April	8,800	80,500	357,400	1,296,300
May	3,800	43,500	252,900	1,038,700
June	1,700	17,700	140,500	572,900
July	600	5,700	59,200	235,400
August	400	2,100	29,800	138,200
September	300	1,200	25,400	121,500
Total	74,200	682,900	2,696,900	9,077,900
Total streamflow, yearly average for above listed rivers		16,692,300		

NOTES: Records for all stations except Eel River at Scotia, are preliminary estimates subject to revision. Trinity River near Hoopa has been reduced to account for the effect of Trinity diverson project. Klamath River near Klamath has been adjusted for probable future upstream development and Trinity diversion project.

According to the source, these runoff figures do not include small creeks such as Elk Creek, Bear River, Salmon Creek, etc.

Senator YOUNG. Is Mr. Milton Kidd here? Mr. McCaffery? Mr. Hanna?

Mr. MCCAFFERY. McCaffery from the University of California. I filed a statement which the chairman said would be read into the record.

Senator YOUNG. Thank you. That will be in the record.

Mr. Hanna?

Mr. Hill? Is Mr. Hill here?

Mr. Reber?

Mr. MILLER. Senator Young, we now have the material that we were waiting for and we would like at this time leave to present it to you.

Senator YOUNG. Yes.

Mr. MILLER. State Senator George Miller.

Senator YOUNG. Yes. That will be fine, sir. Will you proceed?

Mr. MILLER. Thank you.

STATEMENT OF CALIFORNIA STATE SENATOR GEORGE MILLER

Mr. MILLER. This is a statement of which copies have been distributed to the staff of your committee. It was authorized by Mr. Frederick Bold, a member of Mr. Thomas Carlson's law firm and it is comparatively short. I think it lays out the problem rather clearly and I would like permission to read it to the committee, and at the same time to present the committee several charts that indicate the problem. I certainly recognize, being a member of the California Legislature, that you people don't want to be burdened with paper, with long explanations about any technical subjects. I think suffice it to show you the type of charts that are available and explain the problems and ask leave of your commitee to submit reproductions of these charts to your staff for transmission to the members of the committee.

The problem of intrusion of saline ocean water into the lower portion of the Sacramento-San Joaquin Delta and the damage thereby

caused by industry and agriculture, particularly in the northeastern portion of Contra Costa is one of the oldest, most persistent and most thoroughly investigated water problems of the State of California. A partial list of investigations and reports is attached hereto. The problem becomes more serious each year as land development and water use throughout the Central Valley of California reduces the river flow into the upper reaches of the San Francisco Bay.

The problem first became acute as a result of the relatively low runoff which occurred during the years 1918 to 1920, and when the first cordinated plan of water resource development in California was published in 1923 (Bulletin No. 4, Division of Engineering and Irrigation, Department of Public Works, California) it was recommended that a physical barrier be constructed in the vicinity of Chipps Island at the westerly end of the delta to prevent salinity intrusion.

During the years that followed further investigation of California's water problems resulted in the State Water Plan published in 1930 (Bulletin No. 25, Division of Water Resources) wherein it was recommended that instead of a costly salt water barrier that a dam be constructed on the Sacramento River at Shasta and that releases from storage be regulated to effectuate a hydraulic barrier that would prevent water of more than 1,000 parts per million of chlorides from intruding beyond the city of Antioch.

This recommendation was approved by the legislature when it adopted the Central Valley project act in 1933, and it was approved by the voters of California in a referendum of that act. Today the water code of California provides that one of the four purposes of the Central Valley project is the repulsion of saline waters from the lower delta.

When the Federal Government took over the Central Valley project, salinity control was likewise recognized as one of its principal purposes as is expressly stated in Secretary of Interior Ickes' finding of feasibility dated November 26, 1935, and approved by the President on December 2, 1935.

Since Shasta Dam went into operation in 1944, the lower delta has enjoyed substantial benefits from salinity repulsion achieved by controlled releases from Shasta and Folsom Dams.

However on July 10, 1957, the Bureau of Reclamation officially informed the State of California that the Bureau disclaimed any and all obligation to control salinity in the lower delta and stated that "the obligations of the Central Valley project are satisfied when a satisfactory quality of water is provided at the intakes to the Contra Costa and Tracy pumping plants." (Letter from C. H. Spencer, regional director, USBR, to department of water resources and State water board, commenting on State's salinity control barrier investigation.)

Thus it is proposed that the waters released from Shasta and Folsom Dams shall flow down the Sacramento River to Walnut Grove through the delta cross-channel system and into the Delta-Mendota Canal at Tracy and the Contra Costa Canal at Rock Slough, but shall not flow into Suisun Bay to prevent the incursion of salinity.

The significance of this radical change of purpose by the Bureau of Reclamation is the abandonment to sea water instrusion of the entire

lower delta lying westerly and downstream from the delta cross-channel system.

This area consists in over 20,000 acres of some of the most highly productive agricultural lands in the State of California together with the industrial complex along the north shore of Contra Costa County in the vicinity of Oakley, Antioch and Pittsburg. The agricultural lands will be left without any usable water supply throughout the irrigation season. The industrial area which contributes approximately a quarter of a billion dollars annually to the gross national product will be deprived of the natural water supply which was the chief reason for the development of this locality. While this region is within the service area of the Contra Costa Canal, that facility now supplies only a fraction of the total water used and the ultimate requirements of the area are more than five times the maximum capacity of the entire canal.

This problem demands the attention of the Congress since the U.S. Bureau of Reclamation has as recently as this week denied that the State water rights board, or any agency of the State of California, has jurisdiction to compel or require the Bureau to operate the Central Valley project consistently with its declared purposes or to impose any condition upon the Bureau's water rights which would require it to effect salinity repulsion in the public interest.

It is the position of the county of Contra Costa that the lands of the lower delta have prior vested rights to their offshore water supply and that an effective salinity control is a mandatory purpose and function of the Central Valley project. When demands upon the water supplies in the delta become so great that it is no longer economically feasible to repel saline water by hydraulic barrier, then the water requirements of Contra Costa County must be satisfied by a substitute overland supply at a cost to the user no greater than that of pumping from the river to the point of use.

We are grateful for the opportunity to bring to the attention of the committee this important problem.

On the last and final page there is a list of some 13 citations, at least they are citations of some sort or another referring to salinity control investigation reports that have been made.

I would also like to bring to the attention of the committee some documents that have been prepared by the county of Contra Costa that point out Contra Costa water requirements. This is an up-to-date pamphlet issued in September 1959 to provide supplemental capacity information about the 1959 salinity problem.

Also, in addition to that, Mr. Chairman and gentlemen, we will ask leave to forward copies of the charts such as this one here that shows the principal water service areas of Contra Costa County and shows the adjoining and adjacent developable lands. This other chart of which there is only 1 of some 25, showing salinity encroachment problems that are presented and that are in effect as a result of plans under the California water program. This happens to be a chart showing a dry spring and it is only representative of the several other charts that we ask leave to submit to you.

Senator KUCHEL. I will say for the committee that we will be glad to have those. Although the committee, itself, is not designed to hold hearings on specific legislation, these charts and documents will be of use to us in Washington, especially to Senator Engle and myself.

In addition, I wonder if it would be possible for you to supply for the record, a copy of the late Secretary of the Interior Ickes' statement at the time that administratively it was determined to construct the Central Valley project; the text of the Bureau's notice to the State canceling it out; and, thirdly, a copy of the new law which you sponsored in the last session of the legislature?

Mr. MILLER. I am certain we can do that, Senator Kuchel. It will be forthcoming in the very near future.

Senator KUCHEL. Thank you very much, Senator.

Mr. MILLER. I have one more thing I would like to call to your attention.

The fact that the State of California recognized the problem of which I spoke and which was mentioned in Mr. Bold's communication to the committee, resulted in our making final plans to determine the scope of an investigation. The legislature has appropriated, I believe, $200,000 to determine what is the best way to do this. I think I can anticipate that representatives of Contra Costa County and the State of California are going to be calling on you in Washington on your next budget to see if we can't get some help to make this joint venture. Contra Costa County agreed they will participate in it financially as well as contributing other resources. The State of California likewise will participate and we like to help in the Bureau because we think it is our problem and not just a problem of any one segment of this interest.

That is all I want to say. Thank you very much for your courtesy and consideration. We like to have you in California, and come back.

Senator KUCHEL. Thank you very much, Senator.

(The statement and list of citations follows:)

STATEMENT OF FREDERICK BOLD, JR., ATTORNEY

My name is Frederick Bold, Jr. I am an attorney, a member of the law firm of Carlson, Collins, Gordon & Bold with offices in Richmond and Martinez, Calif. My firm is special counsel on water problems to the boards of supervisors of the counties of Contra Costa and Solano.

The problem of intrusion of saline ocean water into the lower portion of the Sacramento-San Joaquin Delta and the damage thereby caused to industry and agriculture, particularly in the northeastern portion of Contra Costa County is one of the oldest, most persistent and most thoroughly investigated [1] water problems of the State of California. The problem becomes more serious each year as land development and water use throughout the Central Valley of California reduces the river flow into the upper reaches of the San Francisco Bay.

The problem first became acute as a result of the relatively low runoff which occurred during the years 1918 to 1920, and when the first coordinated plan of water resource development in California was published in 1923 [2] it was recommended that a physical barrier be constructed in the vicinity of Chipps Island at the westerly end of the delta to prevent salinity intrusion.

During the years that followed further investigation of California's water problems resulted in the State water plan published in 1930 [3] wherein it was recommended that instead of a costly salt water barrier that a dam be constructed on the Sacramento River at Shasta and that releases from storage be regulated to effectuate a hydraulic barrier that would prevent water of more than 1,000 parts per million of chlorides from intruding beyond the city of Antioch.

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[1] A partial list of investigations and reports is attached hereto.
[2] Bulletin No. 4, Division of Engineering and Irrigation, Department of Public Works, California.
[3] Bulletin No. 25, division of water resources.

This recommendation was approved by the legislature when it adopted the Central Valley Project Act in 1933, and it was approved by the voters of California in a referendum of that act. Today the water code of California provides that one of the four purposes of the Central Valley project is the repulsion of saline waters from the lower delta.

When the Federal Government took over the Central Valley project, salinity control was likewise recognized as one of its principal purposes as is expressly stated in Secretary of Interior Ickes' finding of feasibility dated, November 26, 1935, and approved by the President on December 2, 1935.

Since Shasta Dam went into operation in 1944, the lower delta has enjoyed substantial benefits from salinity repulsion achieved by controlled releases from Shasta and Folsom Dams.

However on July 10, 1957, the Bureau of Reclamation officially informed the State of California that the Bureau disclaimed any and all obligation to control salinity in the lower delta and stated that "the obligations of the Central Valley project are satisfied when a satisfactory quality of water is provided at the intakes to the Contra Costa and Tracy pumping plants." [4]

Thus it is proposed that the waters released from Shasta and Folsom Dams shall flow down the Sacramento River to Walnut Grove through the delta cross-channel system and into the delta Mendota Canal at Tracy and the Contra Costa Canal at Rock Slough, but shall not flow into Suisun Bay to prevent the incursion of salinity.

The significance of this radical change of purpose by the Bureau of Reclamation is the abandonment to sea water intrusion of the entire lower delta lying westerly and downstream from the delta cross-channel system.

This area consists in over 20,000 acres of some of the most highly productive agricultural lands in the State of California together with the industrial complex along the north shore of Contra Costa County in the vicinity of Oakley, Antioch, and Pittsburg. The agricultural lands will be left without any usable water supply throughout the irrigation season. The industrial area which contributes approximately a quarter of a billion dollars annually to the gross national product will be deprived of the natural water supply which was the chief reason for the development of this locality. While this region is within the service area of the Contra Costa Canal, that facility now supplies only a fraction of the total water used and the ultimate requirements of the area are more than five times the maximum capacity of the entire canal.

This problem demands the attention of the Congress since the USBR has as recently as this week denied that the State water rights board, or any agency of the State of California, has jurisdiction to compel or require the Bureau to operate the Central Valley project consistently with its declared purposes or to impose any condition upon the Bureau's water rights which would require it to effect salinity repulsion in the public interest.

It is the position of the county of Contra Costa that the lands of the lower delta have prior vested rights to their off-shore water supply and that an effective salinity control is a mandatory purpose and function of the Central Valley project. When demands upon the water supplies in the delta become so great that it is no longer economically feasible to repel saline water by an hydraulic barrier, then the water requirements of Contra Costa County must be satisfied by a substitute overland supply at a cost to the user no greater than that of pumping from the river to the point of use.

We are grateful for the opportunty to bring to the attention of this committee this important problem.

PARTIAL LIST OF REFERENCES TO SALINITY CONTROL INVESTIGATIONS AND REPORTS

1. "Water Resources of California," Bulletin No. 4, Division of Engineering and Irrigation, 1923.

2. "Salt Water Problems of the San Francisco Bay and Delta," report of Thomas H. Means, 1929.

3. "Report on Salt Water Barrier," Bulletin No. 22, Division of Water Resources, 1929.

4. "Report on State Water Plan," Bulletin No. 25, Division of Water Resources.

5. "Variation and Control of Salinity in the Sacramento-San Joaquin Delta and Upper San Francisco Bay," Bulletin No. 27, Division of Water Resources, 1931.

[4] Letter from C. H. Spencer, regional director, USBR to department of water resources and State water board, commenting on State's salinity control barrier investigation.

6. "Economic Aspects of a Salt Water Barrier," Bulletin No. 28, Division of Water Resources, 1931.
7. "Report on Central Valley Project," by H. W. Bashore, Bureau of Reclamation.
8. "Finding of Feasibility of Central Valley Project," Secretary of Interior, 1935.
9. "Report of the Secretary of Interior on Central Valley Project," 1945, Senate Document No. 113, 81st Congress, 1st session.
10. "Central Valley Project Studies," Problem 10, USBR, 1947.
11. "Feasibility of Construction of Barriers in the San Francisco Bay System," Water Projects Authority, 1955.
12. "Water Utilization and Requirements of California," Bulletin No. 2, State Water Resources Board, 1955.
13. "Report on Salinity Control Barrier Investigation," Bulletin No. 60, Department of Water Resources, 1957.

Senator KUCHEL. The statement of Mr. George Budde, executive secretary of the California Wildlife Federation, will be received by the secretary. I understand it will be available in the next few days and will be incorporated in the record.

Senator KUCHEL. Edward Hanna?

Is there anyone present who has a statement he desires to submit for the record?

Mr. REICH. The statement of the California farm research and legislative committee.

Senator KUCHFL. Glad to have you.

Give your name, too, please, sir.

STATEMENT OF WILLIAM REICH, CALIFORNIA FARM RESEARCH AND LEGISLATIVE COMMITTEE

Mr. REICH. The California Farm Research and Legislative Committee represents some 1,000 members operating their own commercial farms and located in every agricultural area of California. The committee also speaks for producer cooperatives, soil conservation districts, church, labor, and community organizations who are affiliated with us and who support our reclamation policies.

We wish to reserve the right to file a more comprehensive statement later, elaborating on the principles which I shall now state briefly.

The 11 Western States—California, Oregon, Washington, Idaho, Montana, Wyoming, Utah, Nevada, Arizona, New Mexico, and Colorado—are growing almost twice as fast as the rest of the Nation as America's booming population demands more space for economic expansion, living area, and recreation. California alone will have 37 million people by the year 2000, and the West as a whole probably 80 million.

Failure of the Federal Government to recognize and prepare for this inevitable westward movement could have disastrous economic and social effects on every section of the Nation, resulting in overcrowded urban areas and depleted agricultural land in the East, South, and Midwest, and loss of vast quantities of potential western agricultural, mineral, and industrial wealth.

The key to western expansion is full development of all its water resources and transportation from areas of surplus to areas of need. There is ample water in the so-called arid West if it is properly conserved and distributed. Federal investment in developing water resources of the 11 Western States will pay huge dividends in terms of

agricultural and industrial expansion capable of sustaining an ever-growing population. Irrigation should be restored to high priority in resource development to meet our growing needs of food and fiber and to counterbalance smog-polluted areas with broad green belts of verdant growth.

It has been well over a decade since any fruitful concepts for the use of western water resources have been drawn up. The thirties and early forties saw the maturing of the concept of valley and region-wide authorities, the meticulous analysis of resources, and prospects such as are contained in the Intermountain Report, the Colorado River Report, the comprehensive plan for the Central Valley project, and many others.

While State and local water projects must be encouraged, only the Federal Government has the resources and authority to initiate and coordinate comprehensive, basinwide, interstate, and areawide development and integration of water resources.

Modern industry and agriculture cannot develop without plenty of cheap power. California farmers, for example, consume more than one-fifth of the total electric output of the State. Therefore, public development of hydroelectric power, the paying partner and necessary concomitant of water development, is imperative. Cheap hydroelectric power is vital if water is to be transported economically from regions of surplus to those of deficiency. The ultimate aim should be a western power pool and integrated power grid, as proposed by the Bureau of Reclamation as far back as 1952 ("Study of Future Power Transmission for the West").

Other important "byproducts" of western water development are flood control and recreation.

Western reclamation investment is no drain on Federal taxpayers, but is returned manyfold. Ninety-three cents of every dollar expended by the Bureau of Reclamation for construction and operation of projects will be paid back to the U.S. Treasury. Also, interest is paid on amounts allocated to commercial electric power and municipal and industrial water. The other 7 cents of each dollar is charged against flood control, fish and wildlife conservation, and recreation.

A recent study based on Federal Internal Revenue collections reveals that farmers and townspeople on or in the vicinity of western reclamation projects paid $340 million in income taxes during 1958 fiscal year. Taxes from these areas have totaled $3½ billion since 1940. This is 11 percent more than was spent for project construction since the start of the reclamation program in 1902.

A growing and expanding West provides a constantly expanding market for eastern industries. In 1956, the $53 billion market of the 11 Western States was three times the total export market of the United States.

Food, materials, and human resources supplied by our western reclamation projects have played a vital role in national defense. Yet the entire cost of the reclamation program over its 57-year history would run our Defense Establishment only 1 month at current costs.

The present administration this year sought funds for 1,450 public works projects in foreign lands, none of which were subjected to the engineering and economic feasibility tests that domestic projects must meet. If this foreign aid is justified, which we do not question, cer-

tainly Federal investment in our own resources is not only justified but necessary.

For these reasons we call for an end to the "no new start" policy and for an expanded program for Federal investment in western water projects, and greater Federal initiative in projecting integrated, basin-wide developments which will benefit the entire 11-State area. Your committee should bring together the many studies which have already been made of possible interchanges of water and power—even of population—which would make the most beneficial use of these resources.

Senator KUCHEL. Thank you very much.

STATEMENT OF CHARLES M. WEBER, M.C.E., REPRESENTING THE WEBER FOUNDATION STUDIES

Mr. WEBER. Senator Kuchel, I have a statement I would like to submit to Senator Kerr as chairman, personally addressed to him concerning the question of the basin planning at national level as part of the program which I started with Senator Kerr back in 1951 and 1952.

Senator KUCHEL. Quite correct, and I would be delighted to have it, Mr. Weber. I know of your longtime interest in that subject and it is interesting to recall that Senator Kerr was one of the pilot legislators in that field.

Mr. WEBER. Could I make just another statement for the record?

The Weber Foundation Studies are associated with both houses of the legislature for a master plan of public works, including water resources. This will be in print about December 15 as a State document. I ask in this report to you that it be included in the committee's documentary evidence.

Senator KUCHEL. We will receive it for that purpose.

Mr. WEBER. It offers a radical change and tremendous economies in the State water plan beyond belief.

Senator KUCHEL. I will be glad to discuss it with you. I am glad to see you.

(The statement referred to follows:)

STATEMENT BY CHARLES M. WEBER, M.C.E., REPRESENTING THE WEBER FOUNDATION STUDIES

An Approach to a California Public Works Plan

According to the press release from your committee under date of September 3, this hearing in Sacramento today is only one of a number of similar hearings being held throughout the country as a means of securing informed public opinion on the Nation's water problems.

According to this advance release, the committee poses three broad questions relating to national water policy; namely:

(1) The extent to which water resources activities in the United States are related to the national interest.

(2) The extent and character of water resources activities, both governmental and nongovernmental, that can be expected to be required to provide the quantity and quality of water for use by the population, agriculture, and industry between the present time and 1980, along with suitable provisions for related recreational, fish and wildlife values.

(3) Any other information believed to be helpful in considering water resources policies for the future.

It was my privilege to serve as a member of the Assembly of the California Legislature through a period of 16 years, and this legislative service was ended

in the capacity of chairman of the Interim Committee on Conservation, Planning, and Public Works. The last 2 years of this legislative service was devoted to an intensive study of the needs of public works and resource development throughout the State, as taken in more than 36 hearings. The extensive data obtained could not be analyzed and compiled in time for a report prior to the end of my legislative service. This led to the adoption of a special resolution of the assembly, authorizing the completion and submission of such a report at a later date, and this was further supplemented by a similar special resolution of the senate, and these authorizations remain in effect as of today.

Because of the educational nature of the work to be undertaken, the sponsorship was placed under the direction of the Captain Charles M. Weber Memorial Foundation, a public trust created under the laws of the State of California. The studies have been underway for almost 10 years and have been privately financed at a very considerable cost. They are referred to as "The Weber Foundation Studies" and will appear in printed form at an early date as a legislative document under the title "An Approach to a California Public Works Plan." They are dedicated to the memory of my grandfather, Capt. Charles M. Weber, one of the pioneers of California who was active in bringing California into the United States. One of his first activities as an American citizen was the founding of the city of Stockton, dedicating the land necessary for the longtime requisites for development of a civilization—thus he became California's first planner.

Referring again to the committee release, which outlines a series of eight questions on which specific information is desired, we point out that the answers to these questions can only be found through a coordinated statewide plan for all resource and public works development, and in California it is the lack of this coordinated plan of resource development that has been the stumbling block for many years.

The Weber Foundation Studies have been undertaken for the purpose of protecting the people of this State by the creation of a master plan for the development of water resources so as to include in the plans for the development of water supply, other correlated plans for the development of flood control, reclamation, land and water transportation, recreation, wildlife resources, and improvement of land cover for the conservation of soil and watersheds.

This comprehensive approach often conflicts with and contradicts the narrow unilateral development of projects solely for the development of water supply. Very few attempts toward the development of such master plans have been attempted in California, and those that have, have been narrowly limited to the justification of specific projects, both for water facilities and transportation facilities. One notable exception is the broad approach proposed by John Reber for the development of water resources as related to the great transportation requirements of the San Francisco Bay area and the transportation of water to southern California. This proposes a great emphasis on the location of salt water barriers to serve the major transportation crossings of the bay region while protecting the water supply of the Central Valley basins and all imported waters into the delta from salt water tidal intrusion into the delta.

This type of planning enables the moneys which would be spent for the construction of projects conceived and promoted for unilateral benefits to yield simultaneously other lasting benefits for the gradual development of the resources of the State.

The Weber Foundation studies have been made in accord with this broad plan of basinwide development.

The purpose of our appearing today before this U.S. Senate Select Committee on National Water Resources is to outline the organization for the planning procedure at all levels of government—local, regional, and State, and interstate at the level of territorial basins. These matters were informally discussed with you, Mr. Chairman, in 1951 and again in 1952, with the view in mind that further studies would be made and definite recommendations would be submitted which might apply to congressional legislation necessary to establish the procedure of coordinated basin planning, both in the legislative and executive branches of our National Government. Unfortunately, the great controversy which has arisen in California on the plans for the development of our water resources, and the methods of constructing and operating the systems, pointed out the lack of existence of such a master basin plan in California. Therefore the Weber Foundation undertook to create such a plan as an example to all levels of government as to what might be achieved by State coordinated regional planning.

The California Planning Act, as amended in 1937, set up the necessary procedures for State coordinated regional planning at all levels of government. The act recognized the well-developed principles of city and county planning and called for the establishment of regional planning districts based upon physiographical divisions of the State, with primary emphasis on the watershed areas as defining the divisions of the regions.

The act called for the creation of a State conservation and planning board, having advisory powers only, and relying upon the planning procedure at local government levels to implement any plans necessary to the broader development of the State by coordination. The powers and duties of the State conservation and planning board would be limited to coordinating and implementing the projects and systems of public works proposed by the bureaus and departments of local, State, and Federal Goverment. In an advisory capacity the board would serve in the cause of the general welfare of the people of the State and Nation, and check and balance the plans and policies proposed by the executive branch of the Government.

Unfortunately, the Legislature of the State of California has never been able to agree upon the creation of the State conservation and planning board provided for in the Planning Act, title 7 of the governmental code. However, during the past three sessions of the leigslature a step has been made in that direction by the creation, within the department of finance of State government, of the office of State planning and a statewide planning advisory committee, all directly under the control of the Governor, and having limited powers under the Planning Act, as amended. Section 65013.2 of the government code (ch. 1641, 1959 statutes) provides, among other duties:

> "The State office of planning through the director of finance shall:
>
> (a) Prepare, maintain, regularly review and revise a comprehensive, long-range, general plan for the physical growth and development of the State, in cooperation with, and utilizing the physical development plans as prepared by, State, local, regional, and Federal agencies, which plan shall be known as the State development plan.
>
> "(b) Assist the budget division of the department of finance in the preparation of the capital improvement section of the annual budget and a long-term capital improvement program.
>
> "(c) Act as a research agency responsible for the coordination of basic studies and investigation of the resources of the State and of existing and emerging developmental problems, and for the undertaking of such studies when necessary.
>
> "(d) Act as a central repository for State, Federal, regional, and local research studies, plans and project proposals relating to the existing and future physical growth and development of the State and to the conservation, use and development of its resources.
>
> "(e) Encourage the formation and proper functioning of local and regional planning agencies."

and in section 65015.3 states:

> "The State development plan shall embody State policy regarding the State's physical growth and development and shall include by discussion and agreement between the agencies involved, the projects and other improvement proopsals of the departments and divisions of the State government, the projects and improvements proposed by the Federal Government, and the major aspects of master or general plans of regional and local agencies of government."

Largely because of departmental opposition, the legislature has failed to create the originally recommended State conservation and planning board. I am sure, however, that the experience that will be developed under the State planning office and its advisory committee will eventually lead to legislative approval of a State board to function in the manner proposed since 1937. I say this because of the States' previous experience under the reconstruction and reemployment commission, a postwar planning board dominated by departmental heads as ex-offcio members. It demonstrated that these administrators could not serve two masters, the norrower and constrained interest of the executive branch, and the broader interest of the public in the cause of the general welfare. This commission was abolished by the legislature.

In general, the organization of the planning function has its duties in the cause of the general welfare, and what merger powers have been given it have been given under the police powers of the State at all levels of government.

The planning procedure in government developed gradually over a period of years as the result of complex problems arising from the development of modern civilization, and the validity of action taken through the planning procedure, was established by the courts under the powers retained by the people to protect their general welfare.

As the author of the Planning Act of 1937, while a member of the assembly, every effort was made to establish a procedure of state coordinated regional planning, as devised in a thesis and proposed in 1931 for legislative enactment. It was recognized that the powers implementing the procedures of planning were derived directly from the people in the cause of the general welfare, and that a new procedure in government had been established, not a part of any of the three branches established by the Constitution but related to all of them.

Therefore, in the Planning Act of 1937 it was decided to place the State conservation and planning board in a position to be advisory to all branches of government, but to be independent of each of them. It was felt that it would be more in conformity with the American principles of government if the planning function would remain on an advisory basis rather than be placed in a position where the boards and commissions would have powerful central authority to execute their plans, and this became the intent of the legislature. We believe this to be a realistic and proper organization of the powers and duties granted by the people to the planning boards. In this manner the central planning board could not interfere unduly with the plans of the executive branch of the government, but yet could be a powerful influence against narrow project planning by the brueaus, which is often limited in concept and benefits, and too extravagant.

Furthermore, we believe that this procedure should be established in every State in the Union, and that the representatives of these State commissions would form the basis for the development of interstate and basin planning, and that Congress should pass legislation which would establish the organization of basin planning commissions, whose members would be composed of those selected from the several States lying within the territorial basin.

To implement and to make effective and possible the formulation of adequate plans and policies by such territorial basin planning boards, the staffs of the several bureaus and departments of Federal and State government would furnish the basic data and evaluation of planned projects by the several departments, including such coordinating agencies as may exist in the President's office and the Bureau of the Budget.

Back in 1950 the President's Water Policy Commission, in its comprehensive report entitled "A Water Policy for the American People," made specific recommendations of this nature when it said:

"Congress should direct the responsible Federal agencies to submit new proposals for water resources development to Congress only in the form of basin programs which deal with entire basins as units and which take into account all relevant purposes in water and land development. This multiple-purpose basin approach should apply to the whole process by which water resources projects move from the survey to the authorization and appropriation stages. It would enable Congress and the people concerned to have a clear picture of the entire program for each basin and its relation to the economic and social development of the region and the Nation.

"To insure the preparation of sound basin programs, Congress should direct the responsible Federal agencies to cooperate with each other and with the appropriate State agencies in the necessary surveys and plans. Such action requires some definite coordination of the efforts of Federal and State agencies. While administrative reorganization in the field of natural resources is outside the assignment of this Commission, the Commission believes that, lacking such agency reorganization as was recommended by the Commission on Organization of the Executive Branch of the Government (Hoover Commission), Congress should set up a separate river basin commission for each of the major basins. These commissions, set up on a representative basis, should be authorized to coordinate the surveys, construction activities, and operations of the Federal agencies in the several basins, under the guidance of independent chairmen appointed by the President and with the participation of State agencies in the planning process.

"Congress should designate the Federal departments and independent agencies to participate in the river basin commissions. Such participation should pro-

vide for representation of all agencies with functions included in water resources programs. Congress should assure all such agencies adequate authority to participate in comprehensive planning on an equal basis, together with appropriations consistent with such participation."

As an example of some of the U.S. departments that would act in this capacity, there is the Department of Agriculture, the Bureau of Reclamation in the Department of the Interior, the Corps of Engineers of the U.S. Army, the Bureau of Public Roads in the Commerce Department, and many others, together with similar departments within the State governments that aid in the development of policy and assist the Congress to make the necessary laws for the development of our civilization.

An additional organization, implementing the procedure of factfinding and planning at the legislative level of government, should be established by the State legislatures and the Congress, to aid the interim committees in the coordination of facts ascertained by the several committees, so as to assist the members of the legislative branch to formulate well-defined policies broadly conceived and in the best interests of the people, both in the short run and the long run of time. It should be noted here that the procedure of planning aims to harness the imaginative powers of the human mind to the development of the State and the Nation in the most desirable and economical manner.

You, Mr. Chairman, are well aware of the success of wide regional resources planning, such as was carried out in the five States containing the Red River Basin which you initiated through congressional action, and which formulated a basinwide development administered under a representative board and was served by the Corps of Engineers at the planning and policymaking level. This pioneer development is an outstanding example of the benefits to be derived by coordinated basinwide planning and should serve notice by the fruits of its accomplishment, on those who would prevent the organization of such planning procedure in Government.

An even later demonstration of basinwide planning and development is that of the Missouri Basin, carried out under the direction of the Corps of Engineers of the U.S. Army, and with the full cooperation of all of the States involved.

Your committee is well aware of the phenomenal increase in population in California and the tremendous rapid development resulting therefrom. Similar growth is occurring in other States as well. This growth demands that such coordinated planning procedures be established without delay. Otherwise the encroachment into the reservoirs and upon other rights-of-way needed for great public works systems may prevent the construction of such works. Or the conflicting improvements carried forward by individuals and public agencies may create unreasonable costs of land acquisitions and damages. Furthermore, the opportunity may be lost for joint planning for multiple use of the rights-of-way. Such negligence could prevent the proper development of our resources.

Copies of the Weber Foundation studies in final published form will be furnished to your committee, and we respectfully request that it be reviewed by your executive staff, that such sections as the staff finds appropriate for further study be so indicated in its report to your committee, and that finally the full published report be made a part of your committee records.

Senator KUCHEL. Is there any other statement by anyone in the audience to be filed?

Does Mr. Reber contemplate returning this afternoon? Does anybody know?

FROM THE AUDIENCE. He just left a minute ago and I will see if I can find him.

Senator KUCHEL. We will take a recess for 20 minutes.

(Brief recess.)

Senator ENGLE. In the absence of our vice chairman and our chairman, we will proceed to further hearing of the witnesses.

Without objection the statement of George Issel, representing the Aquatic Resources Committee will be incorporated in the record in full.

(The statement referred to follows:)

STATEMENT OF GEORGE ISSEL, AQUATIC RESOURCES COMMITTEE

AQUATIC RESOURCES COMMITTEE

Gentlemen, acting in accordance with the consent of your committee granted to Mr. George Issel, chairman of the Aquatic Resources Committee, during the hearing held in Sacramento on October 15, 1959, we are forwarding this statement and requesting that it be made a part of the official record of the Senate Select Committee on National Water Resources.

The Aquatic Resources Committee is an official group, which through its membership, represents a vast majority of those who depend upon the water resources of California for their livelihood and recreation. The ARC enjoys membership consisting of representatives from statewide sportsmen's organizations and commercial fishery interests, AFL–CIO, and recognized authorities in the field of science. We emphasize the membership of the ARC only to demonstrate the fact that this organization can speak with authority for lay, practical, and scientific viewpoints on problems generated by the need for correct utilization of our natural water resources.

In the past plans for the conservation, utilization, and control of waters in our State have failed to give full consideration to the enhancement of recreation and the continued natural propagation of our fishery resources. This lack of consideration has resulted in numerous instances in the destruction of certain fisheries. For example, the deplorable lack of planning for water releases below Friant Dam on the San Joaquin River not only destroyed the salmon runs but also resulted in serious pollution, public health hazards, and has almost completely eliminated a highly valuable recreational area.

We are of the unanimous opinion that it is in the public interest that any plans relating to the beneficial use of water must include provision for the protection of fishery resources and public recreation. Further, we respectfully suggest that the Senate select committee advocate statutory legislation designed to accomplish this purpose.

Senator ENGLE. The Chair observes the presence of Senator Ed. Wiggins. Do you have a statement to make, Senator Wiggins?

Mr. WIGGINS. No, I am an observer. Thank you, Senator.

Senator ENGLE. Do you desire to have it placed in the record?

Mr. WIGGINS. No; I said I am merely observing now.

Senator ENGLE. I thought you said you were going to reserve it.

Mr. WIGGINS. No; I am merely observing.

Thank you, Senator.

Senator ENGLE. Without objection the statement of Mr. Clair A. Hill will be made a part of the record in full at this point.

(The statement referred to follows:)

STATEMENT BY CLAIR A. HILL

Mr. Chairman and members of the committee, my name is Clair A. Hill. I am a consulting civil engineer with offices in Redding, Calif. Having served for 9 years on the California Water Commission during the preparation of what is now known as the California water plan, I still have an intense interest in the development of the water resources of this State.

In reviewing the information desired by the committee, I find that a great deal of the factual data that is requested will be supplied by the State of California, the Bureau of Reclamation, and the Corps of Army Engineers, so my discussing much of this information would be unnecessary and a waste of the committee's time. I will confine my remarks to a limited number of items which I think will probably not receive adequate attention in the overall picture.

In California, roughly half of the water comes from the underground reservoirs. Much of the surface water that runs off from our mountains comes from the snowpack zone of the upper reaches of the Sierra Nevada and Cascade Mountains. As more water is required in those areas that have ground-water basins, more wells are drilled, more pumps installed, more water pumped from the ground, and many of the basins are exploited beyond the natural recharge.

We have been building dams, as rapidly as financing is available, for power production, flood control, and water conservation for domestic, industrial, and irrigation purposes; to the point where we are rapidly running out of dam sites.

In Bulletin 3, which is known as the California water plan, it is pointed out that to serve the ultimate needs of the State of California, these ground-water basins will have to be operated just like surface reservoirs, being recharged in the wet seasons and wet cycles, and being drawn down in the dry seasons and dry cycles. To accomplish this, much more knowledge of how this can be accomplished is necessary. There is some research that has been conducted on the subject of recharge of the ground-water basins, but in my opinion, compared to the future needs of this ground-water basin, these studies are very much in the category of the famous rabbit stew in the ratio of one horse to one rabbit. In my opinion, a large-scale research program must be started in the very near future to determine how these ground-water basins can be operated. If they cannot be operated, as suggested, it is very doubtful whether or not California can store enough water in surface reservoirs to serve its ultimate needs.

Parallel with this investigation and research in the engineering phases, must go legal research and preparation so that the ground-water basins can be legally operated.

The second item, which, in my opinion, is not receiving adequate attention, is the conservation of our snowpack. As previously stated, approximately half of our water comes from the Sierra snowpack. It is my understanding that there has been some research carried on in Colorado on snowpack management and in the Sierras there has been a joint project between the State of California and the U.S. Forest Service, studying snowpack management. Compared to the importance of this snowpack, the $100,000 a year being spent in these studies may be inadequate. It is very important that this program be carried on at an adequate rate, because at the rate of timber cutting in California, we are rapidly encroaching on this snowpack and it is important that this cutting pattern be modified so that the greatest possible yield can be obtained from the snowpack. We do not know at this time what this pattern should be.

I would like to suggest that this committee ask for a report on these studies to date so that you will be in a position to evaluate the needs as against the research being conducted.

The last subject which I would like to discuss is the matter of financing the water development in the Sacramento Valley of California. The reason that I am limiting this to the Sacramento Valley is that the reports that have been, or will be, submitted to you by the department of water resources show that only in the Sacramento Valley and in the north coastal area is there surplus water for export. This program of conserving of the waters of the Sacramento Valley and transferring it to the San Joaquin Valley and other areas was started with the construction of Shasta Dam and the other units of the Central Valley project, which was built by the U.S. Bureau of Reclamation. Later, the American River at Folsom was partially controlled for flood control, water conservation, and power development by construction of Folsom Dam. Still later, the Monticello Dam was built on Putah Creek by the Bureau of Reclamation for water to be used by adjacent counties.

The State of California now has under construction, the big Oroville Dam and certain tributary dams for conserving the waters of the Feather River, which is the major tributary of the Sacramento River. The U.S. Army Engineers also have under construction, Black Butte Dam on Stony Creek, which is largely a flood control project, but has certain conservation benefits. The study of the dollar requirements to meet the needs for water development in California makes it very apparent that this financial load must be distributed as much as possible between Federal, State, and local agencies. However, this development on the same stream system by a number of different agencies, leads to many problems. One of the biggest problems is that the first major structure on any stream system takes the cream in the form of natural flows, from the stream, making it more and more difficult to finance subsequent projects.

In the construction of Folsom Reservoir, Sly Park Reservoir was constructed as a part of the overall project so obtains benefits from the power revenues of the major project.

In the case of the State's Feather River project, certain upstream dams were authorized as part of the overall project. This system partially meets the prob-

lem, but I believe a means must be found whereby power revenues would assist in the smaller developments whether or not they are made at the same time.

I hope these comments will be of help to the committee and I appreciate the opportunity to appear before you.

Senator ENGLE. Are there further statements to be made part of the record?

If not, we will prepare to hear the testimony of Mr. John Reber, of San Francisco.

Are you ready to proceed?

Mr. REBER. Will Senator Kuchel be back?

Senator ENGLE. Yes, he is coming back in a few minutes.

Mr. REBER. Please postpone me until he returns.

Senator ENGLE. If I can find some people to testify, I will. Since nobody wants to testify, the meeting will stand in recess until we get more Senators.

Mr. HANNA. I am here for the Tri-County Water Authority regarding the tunnel.

Senator ENGLE. Will you come forward, please and identify yourself for the record?

We are now in order again. We are glad to have your statement. You may be seated if you desire.

STATEMENT OF EDWARD R. HANNA, VICE PRESIDENT OF THE BOARD OF DIRECTORS OF THE SANTA CLARA-ALAMEDA-SAN BENITO WATER AUTHORITY

Mr. HANNA. The name is Edward F. Hanna, vice president of the board of directors of the Santa Clara-Alameda-San Benito Water Authority.

Our attorney had literature for the committee. We will submit a written statement for the record to the office of Senator Kuchel at a later date.

Our chief interest in the development of a plan lies in the extension of the San Luis project through the Pacheco Tunnel as outlined this morning as part of the San Felipe project. That water is for San Benito, Monterey, and San Luis Counties.

We wish to thank you for the opportunity to place a statement before the committee.

Senator KUCHEL. Thank you very much. Glad to have your statement.

Are there others who desire to make statements or to submit statements?

If not, the committee will stand in recess until the return of Senator Kuchel.

(Brief recess.)

(The statement referred to follows:)

STATEMENT BY EDWARD R. HANNA, VICE CHAIRMAN OF THE SANTA CLARA-ALAMEDA-SAN BENITO WATER AUTHORITY

Mr. Chairman and members of the committee, I appeared before your committee on October 15, 1959, at your hearing in Sacramento, Calif. I respectfully submit this statement for inclusion in the record of that hearing in accordance with your permission then granted.

HISTORY OF WATER DEVELOPMENT IN THE SANTA CLARA-ALAMEDA-SAN BENITO WATER AUTHORITY AREA

Santa Clara Valley is the central and most developed part of this area. It consists of about 200,000 acres of highly developed agricultural land dotted by cities and bordered on three sides by hills and on one side by San Francisco Bay. The rainfall in these hills is about twice as great as in the floor of the valley, and this affords a very valuable source of water. The Santa Clara Valley Water Conservation District and the South Santa Clara Valley Water Conservation District have, since 1934, built 10 dams on the streams in the hills bordering the valley.

It is estimated that the total water conserved by these dams since they were built is about 1½ million acre-feet of water. These improvements cost about $20 million and were entirely paid for locally. This water has been a lifesaver for the valley, but the demand for water has been increasing and all the feasible local supplies have been developed, with the exception of waste water salvage hereinafter mentioned.

SUBSIDENCE

The valley has underground storage capable of holding about 1 million acre-feet above an average water level of 160 feet below ground level. At present the average ground water level is about 130 feet below ground level. Due to the low water, the ground surface is sinking and the Coast and Geodetic Survey has estimated that the city of San Jose has subsided about 8 feet since the first readings were taken. This subsidence increases flooding, increases the possibility of salt water intrusion, severely complicates problems of sanitary sewer and storm drain flow, and decreases the underground storage capacity.

It is evident, therefore, that supplemental water must be imported into the valley in order to replenish the underground supply and to provide for the increased use of water.

WATER REQUIREMENTS

Southern Alameda County is suffering from salt water intrusion, and certain San Benito County areas are infested with boron. The areas on both sides of the Pajaro in Santa Cruz and Monterey Counties are suffering from salt water intrusion. None of these areas has local water supplies that can be economically developed and a supplemental supply must be imported. Studies indicate present and growing needs culminating at full development, assumed as the year 2010, in the following estimates:

South Alameda County, 200,000 acre-feet annually.
North Santa Clara Valley, 160,000 acre-feet annually.
South Santa Clara Valley, 12,500 acre-feet annually.
Hollister area, San Benito County, 50,000 acre-feet annually.
Pajaro-Watsonville area, Santa Cruz County, 15,000 acre-feet annually.
Pajaro-Moss Landing area, Monterey County, 10,000 acre-feet annually.

PROPOSED SOURCES OF WATER

Two possible sources of imported water are available for the above areas; these are:

(1) The South Bay aqueduct, proposed by the State department of water resources. This would bring water from the Delta-Mendota Canal, or from the Feather River aqueduct into Alameda County and down to the Santa Clara line at Airpoint. The first construction contract on this aqueduct was awarded on October 22, 1959.

(2) The proposed San Felipe division of the Central Valley project, which would bring water from the proposed San Luis Reservoir through Pacheco Pass by tunnel into Santa Clara Valley, San Benito County and the area in Santa Cruz and Monterey Counties on the Pajaro River.

JOINT FEASIBILITY STUDY OF THE SAN FELIPE DIVISION OF THE CVP

The areas in Alameda County needing supplemental water can be served through the South Bay aqueduct, but it appears that a more feasible route into Santa Clara, San Benito, southern Santa Cruz and northern Monterey Counties is through the Pacheco Pass. One of the factors affecting this proposed project is that there is an ideal site for a dam and reservoir in Pacheco Pass. This is

located below Elephant Head Peak above Bell Station. This site has been studied by several authorities and is shown on the maps of the State highway department as the Harper Dam site. It would conserve an average of about 14,000 acre-feet of water per year and could store about 70,000 acre-feet of water and provide valuable flood control. In addition, it would make possible an entrance into the Santa Clara Valley Water Conservation District from above and eliminate the necessity of a pumping plant below Anderson Reservoir.

In 1958 the Santa Clara-Alameda-San Benito Water Authority requested that the Bureau of Reclamation be directed to make a feasibility study of the Pacheco project, and offered to pay one-half of the cost of the proposed investigation. Congress authorized the Bureau to do the work, as requested, with joint financing. The study is now well underway under the title, "San Felipe Division of the CVP." The estimated total cost of the study is $400,000. It may be pointed out that in securing this legislation we had the invaluable support of, among others, two members of this committee, Senator Kuchel and Senator (then Representative) Engle.

This proposed project would bring water into Anderson Reservoir, which is the entrance structure for the distribution system of the Santa Clara Valley Water Conservation District to serve the whole valley. It would also provide water to be fed into the San Benito County distribution system through Pacheco Creek and into the Santa Cruz-Monterey area through the Pajaro River.

CLOUD NUCLEATION

The Santa Clara Valley Water Conservation District, which is the largest unit of the Santa Clara-Alameda-San Benito Water Authority, has just entered into a 3-year contract with the Weather Modification Co. to continue its program of cloud seeding. This program has been in operation since 1951–52, except for the seasons 1953–54. The indications are that cloud nucleation increased the rainfall over the target area from 15 to 30 percent each year.

WASTE WATER SALVAGE

The cities of San Jose and Santa Clara own and operate a sewage treatment plant which processes about 40,000 acre-feet of sewage per year. It is planned to spend about $20 million in enlarging and improving this plant, so that it will discharge an effluent which can be put to beneficial use. The Santa Clara Valley Water Conservation District built an experimental oxidation pond at the site of the treatment plant and the indications are that the effluent from such a pond is ideal for irrigation.

SUMMARY

From the above it is evident—

(1) That portions of Santa Clara, Alameda, San Benito, Santa Cruz and Monterey Counties all need supplemental water.

(2) That the Federal Government, the State of California, and local agencies are all cooperating in the solution of the water problem for this area. This is the kind of action which has been advocated many times by Federal and State officials. Local agencies have been doing everything in their power to assist themselves in the past.

(3) That the feasibility study of the San Felipe division of the CVP is essential to the solution of the local water problem.

(4) That, if the Bureau of Reclamation finds that the San Felipe project is feasible, it should get into the construction phase as soon as possible.

(5) Supplemental water requirements of the tricounty area are principally for agricultural use on intensively cultivated and highly productive prime farmlands devoted principally to fruit and vegetable raising. None of the farm crops in the area are classified as surplus commodities.

In closing, I urge this honorable committee to give us your sympathetic understanding to the end that this ideal cooperative project may be brought to a successful fruition.

Senator KUCHEL. The record of this day's hearing will remain open for inclusion of a statement by Mr. George Sehlmeyer from the California Grange, which will be received by our office in Washington.

Now, Mr. Reber, if you are ready to proceed.

STATEMENT OF JOHN REBER, SAN FRANCISCO, CALIF.

Mr. REBER. Senator Kuchel, Senator Engle, and gentlemen: I was teaching school up in northwestern Ohio out in the country when the old San Francisco earthquake happened back in 1906. I found myself out here the following year and had been visiting San Francisco.

I found the most desperate destruction that you could possibly imagine. I found something else. It was impossible for me to imagine, because Ohio, where I came from, was made by railroads, as is all the East. San Francisco had no railroads, and I knew someday it had to have.

So I started to try to work to bring railroads into San Francisco, which resulted in this plan that I finished, starting in 1907 and finished in 1931.

It has been before the public since that time.

Our own legislature here passed a resolution in 1935 on that plan unanimously.

I was turned over by a director of Gov. Myron Johnson, of the State water resources at Hyatt's office, who in turn turned me over to the magnificent little J. J. Haley, and he made a report.

In the meantime I met up with Secretary of War Dern. I had to do a lot of work for him. I did not get back after a dozen or so conferences with Haley until after that.

I do not want to go into the details of Haley's report because I am afraid I would hurt somebody and reflect on somebody, and most of them have passed away.

Anyhow, Haley told me:

I would not dare to tell you what I am going to tell you unless I knew I was going to die real soon.

So he told me, he said:

The report I took in, Reber, to my superiors was to the effect that your plan, the plan that you have conceived, would do a greater good for California than anything that has ever been conceived for California.

Gentlemen, I think that still stands.

I was very proud. I had nothing to do with these things.

George Cameron, the publisher of the company, sent me over to the Kaiser Co. in 1940, where I spoke to Henry Kaiser, Edward Kaiser, and George Head, with their chief engineer, for 3 or 4 hours. I took up this plan and, of course, I saw them sometimes often since.

They do everything down there, as you know, publishing magazines. There are 60 companies that will soon be housed in that new building on Lake Merrett.

They are in the material that you have, and I have a few more copies of these for some other people around here that would care for them.

In their publication called This Earth, which, by the way, would be a good thing for your committee, or anybody, because it is a look into the future, that is, this certain issue was devoted to that.

Senator KUCHEL. Do you have enough copies so that Senator Engle and I may have one?

Mr. REBER. I believe I left them up there in the envelope.

Senator KUCHEL. I beg your pardon.

Mr. REBER. That is Kaiser's picture of the future. On the inside cover, page 15, they have the seven engineering wonders of A.D. 2000 They are each preceded by a little round white dot.

(1) The Great Atlantic Barrier, a stupendous dam, hundreds of miles long between Greenland and Norway, to fend off the approaching ice age.

(2) The conquest of the Congo Basin, leading to the industrialization of darkest Africa.

(3) Development of the great Australian Desert, through a huge system of ocean water purification and pumping stations.

(4) The England to France underwater expressway—an age-old dream come true.

Of course that has been half built for a half century.

(5) The California water plan, including the San Francisco Bay Reber plan, a reality.

(6) Harnessing the three great rivers of China.

(7) Antarctic colonization—start of full-scale development of underice communities devoted to mining, refrigeration of surplus foods, and scientific and military projects.

Long since, if I had an ego, it has been kicked out of me, chiefly by your department of water resources, during the years.

But anyhow, my name is the only name among all the 2¾ billion people who are on earth who is mentioned as having conceived a plan that they say will be a reality.

You heard Senator Kerr today refer a couple of times to the fact that he was out here in 1950 with the Subcommittee of Public Works. Senator Downey was chairman of that committee, and Senator Kerr, the dear soul, stayed here several days and as today, he had to leave. Those hearings lasted 2 weeks, probably the greatest length of hearing that any such committee has ever devoted to anything. It was brought about by Senate Resolution 119 of the 81st Congress. I wrote that resolution. Of course they rewrote it.

As a result of that resolution and the action of the committee, it was passed in Congress in August of 1950, we have the Rivers and Harbors Act, which included an investigation of the Reber plan because the Reber plan was practically the only thing that was before that committee.

As of today, gentlemen, and I was rather surprised this was not mentioned at all today, we have brought about what is probably the greatest investigation that has ever been known in this country. There are five departments of the Government headed by Cabinet officials, who are in on this investigation, including the Department of Defense, the Department of the Interior, the Department of Agriculture, the Department of Commerce, and the Department of Health, Education, and Welfare.

I was also rather surprised that nobody here today thus far has mentioned anything about the fact that in connection with this investigation the Army Engineers built the greatest scaffold that has ever been built in the world. It is over at Sausalito. That covers about an acre, and it is a scale model of San Francisco Bay.

I think we are about two-thirds through with this investigation. Anyhow, thus far we have had just about $3 million appropriated. We still have about another $1 million to go.

As to the pamphlets that you have, of course I had to move my house up here to bring all the Reber pamphlets. I have a nine-room house and seven rooms filled with Reber plan material from over the years.

I think now that I would like to call your attention to two things that are on the front page of this little pamphlet that you have. That is, the little brochure.

It is titled "Our Perpetual Gift to California and the Nation."

On the right above the map is a statement:

Mr. Reber's background as a schoolteacher and director of amateur theatricals stood him in good stead as he transformed San Francisco and the city across the bay into the most modern and efficient metropolitan area in the world. It has been said of the Reber plan that "it has everything" and Mr. Reber proved this characterization is no mere figure of speech.

It would seem to me that any plan that would create the most modern and efficient metropolitan area in the world should be something that everyone should care for and not object too much to.

On the other side of the page, above the map, is the statement by the great L. H. Nishkian, former Chief of Engineers to the Bureau of Reclamation. He makes the statement:

I have studied the Reber plan for over 5 years and have seen no serious engineering objections or insurmountable difficulties. The advantages in water conserved, land areas developed, recreational facilities, transportation, and dock facilities provided for, and many other advantages developed can be shown to exceed in value $3 to $4 billion.

Today from the statements here it was indicated that they have a runoff in California rivers of 72 million acre-feet of water. You have a precipitation in California of 3 million tons of water. If you want to reduce that to acre-feet, which, of course, I have done, you get a sum of water of 216 million acre-feet of water. A third of that has been measured flowing into the streams. What happens to the rest of it no one knows. A great deal of it, of course, I think maybe a third of it evaporates, and the other third goes into the ground.

We need to also remember that certain States—I think Arkansas, Illinois, and most of Ohio, and some of the other Eastern States—get all their water from the underground. In California you get 70 percent of it.

Senator KUCHEL. How much?

Mr. REBER. Seventy percent.

Senator KUCHEL. Seventy percent.

Mr. REBER. Seventy percent of the water used in California today is pumped from underground.

When I was down in Fresno a few years ago lecturing, and I have made hundreds of lectures and talks on the Reber plan, from San Diego and all over—I never asked to go anywhere. I was always invited. You will find—I am kind of "balled" up here. Excuse me. I have been in the hospital. I have been awfully sick this year.

When I was down in Fresno they told me in introducing me to that meeting of the county chamber of commerce that I addressed that in Fresno or in the Central Valley they had been pumping 5 million acre-feet of water out of the ground and putting back 2 million acre-feet. That, of course, is bankruptcy.

You have an underground basin in the valley down there that is supposedly able to hold 24 or 25 million acre-feet of water. But it

is supposed to be down to 4 million or 5 million acre-feet at the present time.

I am just going to show a couple maps, and then I will go back to this pamphlet again, if I can scramble up here.

This [indicating] is your bay, and God made it.

What I did with this map was this. This is the Reber plan. I put a solid mole across the bay from the valley to Contra Costa County so as to land link the Marina Peninsula with the mainland. I put another solid mole from San Francisco to Alameda County, hinging San Francisco Peninsula with the mainland.

I then proposed these fills with a perimeter of rock, and the red on there is all created land.

Incidentally, this mole up here is more than a block wide, and this one down here is 2,000 feet wide, about as wide as from here to the end of the park down here, the greatest arterials of transportation the world has ever known.

Why? I am awfully surprised nothing of this kind was said at all at this hearing today.

There is more for military purposes; these things are so huge you cannot destroy them.

This filled-in land, the reason why I brought that around here—how can you object to that? This filled-in land is 23 acres bigger than Manhattan Island, right in the middle of this great metropolitan San Francisco Bay region.

The Department of Commerce, who made a portion of the economic survey, called me Monday evening of this week. He had an interview of hours and hours when he was making this investigation. He said he thought this entire 2,000-foot wide would be needed for transportation alone before this 2020 that you heard thrown around here much today comes about.

So you have a place as big as Manhattan Island. It was bought from the Indians for $24 worth of beads. Today it has a valuation, with improvements on it, of $24 billion, a billion to one over the initial investment.

Now I did something else. Of the 300 billion tons of water that falls in California every year over 38 million acre feet flows to sea through the Golden Gate. That is the only outlet. That is draining, of course, as you know, 40 percent of the area of California, and, of course, all that gorgeously pure water from the Sierras.

So the next thing I wanted to use, I wanted to use the basin of San Francisco Bay. It is already built, and it does not cost anything for the storage of fresh water.

This is the greatest storage you will find anywhere in the State.

Walker Young, who started building Shasta Dam and Hoover Dam, started the Central Valley project, told me he thought the lakes would hold 10 million acre-feet of water, but they receive every year 38 million acre-feet of water. My system on this proposition is that these lakes would act as a great watering trough, water flowing in every second of the time, year in and year out, 38 million acre-feet of water flowing in there all the time. Take out whatever you want, take out whatever you want. In fact, you could not use more than half of 38 million, and, of course, some years you do not have that. You have drought years when you do not have 38 million.

Take out whatever you want, and you can supply this whole State with water.

I will bring that up pretty soon when I get down here a little further along.

These lakes, as I say, will extend from near San Jose 150 miles to the tidal limits of Sacramento River, which is up here 10 miles north, the little burg of Verona and extend into the San Joaquin River into Van Allen, at the Stanislaus County line.

So you created this. You can talk about playgrounds. And I wish Senator Kerr were here. The greatest playground in America for boats is in his country down there in an old buffalo range called Lake Texoma. There was a feature article in Colliers magazine before it went busted 6 or 7 years ago, that the boat population on Lake Texoma almost every weekend was over 8,000 boats, and some of them are floating palaces used by the oil millionaries. And they are not any closer than Tulsa or your leading towns there in northern Texas, they are 100 miles away from that lake.

That is all I need to say about that thing, and I will just show this other map.

The Reber plan is a little map on the folders you have, which is this.

I wish George Miller were around here or somebody from Contra Costa County.

Up here I have the only strictly commercial airport that the world has ever known, 3-mile-long runways. That is all made on that filled-in land, of course. That is 3-mile-long runways for land planes and 6-mile-long runways for seaplanes.

And you have all these piers around here, of course. This makes this harbor in San Francisco Bay second only to New York as the greatest harbor on earth. But here every pier and every dock is connected by every railroad that comes into California, including, of course, even the old Northwestern Pacific. They take all the railroads to the two pennies class.

The other thing that surprised me, that has not been mentioned here yet today, is the fact that when we expand here and get those 50 million people, or whatever you anticipate, of course we are bigger than Britain and Britain has 45 million, we are bigger than Italy and Italy has 45 million, we are much bigger than Japan, and it has, if they counted them again today, they probably have an extra million but they had about 90 million the last time they tried to count them—this great State has more natural resources than all those three nations put together.

Vice Admiral Danny Brick was with me. He would take expeditions over to see the bay model. It became one of the tourist attractions. Busloads of children would go there every day. Admiral Danny Brick, and most of the officials from the Matson Navigation went over there, and the first thing he said to me when we were coming back home: "Reber, who in the world ever paid for all those 24 $300-a-day engineers you had that testified before the committee when Senators Downey and Kerr were here?"

I said, "The strange thing is they did not cost anything."

He said, "How did you get them?"

I said, "The way I got them, I just appealed to them for that certain talent within each one that could be useful and asked them if they wished to participate in a Senate hearing, and they all participated."

I think I will get down here. I am tired, anyhow.

As a result of that Senate hearing and the fact that the Government had planned to spend $2 million for this investigation that I brought about, a feature article appeared in the Saturday Evening Post. Of course it carried a map, and there were more than 4 million copies of that certain issue.

Articles on the Reber plan have appeared in about 35 magazines and a little more than 250 newspapers here in California. Most of them have had maps along with it. My own estimate is that more than 7 million maps of the Reber plan have been distributed.

Now, let us get into the pamphlet here and go along as rapidly as possible.

I wish you gentlemen to know, the time I spoke before the Army-Navy Board in San Francisco I spoke for 3 solid hours without a stop. When I spoke before the Senate subcommittee that Senator Kerr attended I spoke for more than 2 hours. So I cannot do all of this in 15 or 20 minutes.

I am sorry Senator Kerr is not here. I have something to say for him.

My friend Charlie Weber sitting behind me, took me back to Washington just 8 years ago right now. I was in Secretary of the Navy Dan Kimball's office, and he wanted me to make a fast trip over to the Bureau of Yards and Docks to see Captain Gerr, who was chief planner of the Navy. So I dashed through that old Pentagon as fast as I could, carrying my heavy briefcase, when I got down to the bottom of the stairs and we were looking for a taxi, as there was none, but soon one drove up and men were jamming out. I said, "Where are you gentlemen from?"

"We are from Oklahoma."

While the rest were jamming out and paying for the taxi, I said, "Listen, I don't know whether you know it or not, but you have one of the grandest men in the world in Oklahoma." So I gave them a fast and furious plug—put in a fast and furious plug for Senator Kerr.

The gentleman said, "I am awfully happy to know all about that. He is my law partner."

Gentlemen, on pages 1 and 2 of this little brochure that you have is a rather bad picture of that scale model, because it is so big you cannot take a picture of it. It is flat, you know. There is a story of the bay model by Harold Gilliam, who wrote the bestseller called "San Francisco Bay," that appeared in the Chronicle the day before the dedication of the bay model.

You also have a small publication up there that was published by the Kaiser Company last July, I think, of this year, that was published by Kaiser Engineering. It is a description of the bay model.

Now, you have a half dozen editorials or articles in papers, also, in this brochure. The one from the Denver Post there is rather interesting, and so forth.

But I am going to start at the bottom there and read a little bit.

The Reber plan is really a three-part subject, as it combines (1) a master plan for the San Francisco Bay metropolitan region with (2) a statewide water and transportation project affecting both northern and southern California. and (3) contains basic military necessities for the Armed Forces and civilian population.

Using God's own materials—rock and earth (30 million tons of rock for the breakwater-type skeleton-perimeter, and 800 million cubic yards of dredged fill)—the Reber plan would unify the San Francisco Bay area by land linking both the Marin and San Francisco Peninsulas with the mainland of Contra Costa and Alameda Counties respectively with earth-and-rock dams each about 4 miles long, and each having the dual purposes of water conservation and providing arterials for transporting automobiles, rapid transit, railroads, and military equipment across San Francisco Bay; which, combined with land fills along the east bay shore connecting the two transbay dams, and bisected by a ship canal, would transform about seven-eighths of the 320,000-acre area of San Francisco Bay into twin fresh-water lakes; and with the lower lake receiving its supply of water from the upper lake via the ship canal. Spillways in the upper dam, ship locks, underpass traffic tubes, and fishways complete the physical works.

God's own materials—rock and earth—cost nothing. Nor would the God-made 280,000-acre reservoir for fresh water made from the basin of San Francisco Bay cost anything, as it already exists; and Walker R. Young (who should know) estimated that the twin lakes of the Reber plan would have a capacity of about 10 million acre-feet of water, and 10 million acre-feet of water is as much water as is today impounded behind all dams which have thus far been built in California. Of course every day it pours in out of the river so you have 38 million before the end of the year. And 280,000 acres of fresh-water lakes would be twice the size of Lake Mead behind Hoover Dam; thus twice the size of the highest manmade lake ever built in America.

Transforming seven-eighths of the tidal basin of San Francisco Bay into twin fresh-water lakes extending about 150 miles from their southern extremity near San Jose to the tidal limits in the Sacramento River some 10 miles north of Sacramento, and to the tidal limits of the San Joaquin River some 15 miles south of Stockton, would not only automatically solve all the water problems of the 12 counties which would border on these twin lakes—Marin, Sonoma, Napa, Solano, Yolo, Sacramento, San Joaquin, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco—but would provide right in the very heart of the San Francisco Bay metropolitan region a fresh-water recreational playground for fishing, boating, and warm water bathing beaches unsurpassed in any other metropolitan area anywhere, and within but a few minutes of everyone who will ever live in the bay region.

But these twin fresh-water lakes also create right in the very heart of California the biggest of all fresh-water lakes, and thus create the key to the solving of just about all of California's water problems; because into these fresh-water lakes on its way to the ocean would continuously pour the entire runoff of the Golden Gate drainage basin of California, which includes two-fifths of California, or 40 million of California's 100 million acres which have their lone outlet to the sea via the Golden Gate. You know, there is more water that flows out through the Golden Gate than all the other streams from the Oregon border to the Mexican border. I think I state that in here.

Now, according to State figures, the average annual runoff of the Golden Gate drainage basin exceeds 36 million acre-feet of water, and 36 million acre-feet of water amounts to 12 trillion gallons of water; and 12 trillion gallons of water is enough water to supply the domestic needs of every human being in the entire world, as 12 trillion gallons would furnish each of the 2.4 billion people who live in the world with 5,000 gallons of water annually. Twelve trillion gallons is much more water than California can possibly use.

However, here are some more interesting facts few realize:

(1) That out through the Golden Gate flows the fourth largest volume of water flowing into the sea within continental United States; that only the Mississippi, the Columbia, and the Mobile Rivers carry greater volumes.

(2) That no river along the Atlantic Coast of the United States from Maine through Florida carries nearly as much water to the sea as flows out through the Golden Gate right here in California.

(3) That the amount of water draining to the sea via the Golden Gate represents more than one-half of all the water California owns and possesses.

(4) That more drains out through the single hole of the Golden Gate than flows into the Pacific Ocean through all the other streams in California all the way from the Oregon line to the Mexican border.

(5) That a mere fraction of the water now wasting into the ocean via the Golden Gate can solve all of California's water problems.

(6) That as to the quality of the water, 95 percent of it originates in the Sierra Nevada Mountains and no purer water can be found anywhere in the world.

Now by merely exercising plain ordinary common everyday horsesense, and by utilizing the twin lakes of the Reber plan at the "horse trough"—merely pumping from the lakes but a mere portion from the continuous inflow of the rivers—all of California's major water problems can be solved in the most economical, the most practical, and the most certain manner; and without infringing on a single "county of origin" or "area of origin" water right. Saving—at the Reber plan would—the fresh water squandered to control salinity in the delta (estimates of the amount vary from 3 to 6 million acre-feet annually), would give southern California more water than they could possibly use.

The 42-mile rock wall perimeter of the Reber plan on water 50 feet deep would expand harbor facilities resulting in the second largest harbor in all the world (New York leads); while those 20,000 acres of created lands along with the east bayshore would be somewhat similar in shape and a little larger in size than New York's Manhattan Island, which, purchased from the Indians for $24 worth of beads, has a present-day value—with improvements—of about $24 billion, or a billion-to-one over the original investment. The potentials of these 20,000 acres for a Grand Central passenger station, downtown airports; commercial and industrial development, expositions, sports stadium, and military establishments are next to unlimited.

All admit our glorious Nation is in grave peril.

The two solid-land transbay dams of the Reber plan have been declared military musts by a Secretary of War due to their accomplishing two basic military necessities for both the Armed Forces and civilian populations.

So much for that. Now, let us get statewide.

I was the first person to talk about carrying water from northern California beyond the Tehachapi. I did that at the time I had the big, long conference with the Secretary of War Dern, who said the Reber plan had to be built because the Nation had to have those two bays, military necessities, water and indestructible connections, in the bay region across the bay.

So on page 5 of the little pamphlet you have, you have my way of taking water south. You will notice that that map was copyrighted in 1946. That was 10 years before the State, I think, even got started on something down there.

We will read from page 5:

You may decide you deem this planning to be the greatest intrastate water and transportation planning ever created for any of the 48 States.

Then I go into military benefits, providing a supplemental water supply to Los Angeles which was not as solid as the one by San Francisco, but I do not go over the mountain 3,000 feet in the air. I go through the Tehachapi, and the tunnel through the Tehachapi is not near as long as the tunnel taking water in New York or New York takes from the Delaware Basin. In fact, back in the Delaware Basin there are now Army Engineers working on that, too, and they are now planning sort of a Reber plan. They asked me for help and I tried to help them out.

They are going to try to make most of Delaware Bay into a fresh water lake.

Along with this planning, that map, Senators, you will notice my canal goes down the west side of the valley. Maybe I ought to keep on reading here. It goes on the west side of the valley at an elevation of a foot or so higher than the elevation of the railroad and highway going down the east side of the highway through the town.

So that from the canal you have a gravity flow serving all the lands between the canal and the Highway 99. The canal can be a

barge canal. The Government is the only people who get into the business of building barge canals. The Army Engineers can build it and it does not cost you anything if you are good enough talkers to talk them out of it.

This new transportation system down there will handle anything that runs on land. You can take an automobile from San Francisco to Los Angeles in 5 hours. You can take a train from San Francisco to Los Angeles in 3 hours.

Now, we come to the cost estimate in the second column, two columns from the bottom.

Cost estimate: Nishkian Engineering has made five separate cost estimates for the Reber plan—$120 million in 1940, $200 million in 1949.

Those were the figures presented to the Senate hearing in which Senator Kerr participated.

Three hundred and forty million dollars in 1956, and $380 million in 1957—

as of today.

The cost estimates go up 5 percent a year; so you add 5 percent on the latest figures for the 2 years.

The next paragraph says:

No such accurate estimate has been made for expanding the Reber plan statewide, but all preliminary estimates show it would be less for the Reber plan, and bring the total for both to less than $350 million or three-fourths billion dollars.

Over on page 6 you have some material printed from the Commonwealth Club, and of course I have been before them dozens of times.

In the little summary in the little paragraph on the right hand column you have the 8-point water supply program of the Reber plan, which is this:

1. Guaranteeing the entire Sacramento Valley all the water it will ever require prior to taking any water whatsoever from the Sacramento Valley for use elsewhere.
2. Supplying the San Francisco Bay region with all the water ever required for every need for all time.
3. Supplying the seven counties of the San Joaquin Valley with all the water required for full development of every acre in the entire valley.
4. Via a tunnel through the Tehachapi supplying Los Angeles and San Diego with all the water they will ever require.
5. From the Tehachapi tunnel, a cutoff to supply the Ventura and Santa Barbara areas.
6. From the south lake of the Reber plan, supplying the San Benito, Santa Cruz, Monterey, and San Luis Obispo Counties with all the additional water they will need.
7. Replenishing the underground water basins from which water is pumped, and holding these underground water basins full up.
8. Providing a wartime guarantee of water no enemy can destroy.

Now, I want to go back to page 1, because I am going to spring something here that I think is going to amaze you all.

Taking the statement above the map:

I have studied the Reber Plan for over 5 years and have seen no serious engineering or insurmountable difficulties. The advantages in water conserved, land areas developed, recreation facilities, transportation and dock facilities provided for, and many other advantages developed can be shown to exceed in value $3 billion to $4 billion.

The Nishkian engineers told me a couple of months ago—I am always lost in time because I just spent 5 weeks in the hospital—all of my stuff is dated from ahead of that.

They told me that they were planning very soon to revise those figures and they thought they would add at least another million to the $3 billion to $4 billion.

But let us take the $3 billion to $4 billion. No one has ever contradicted that. They contradict other things but no one ever contradicted that one.

Gentlemen, the top line on that brochure says, "Our Perpetual Gift to California and the Nation."

Let us say you do this and say you create $3 billion to $4 billion in value. You gentlemen or somebody can certainly set up some agency of Government by which you can take $3 billion to $4 billion and you can build all the rest of it and it would not cost you anything. In other words, you can do this whole California water program, the Reber plan, and it will not cost you a dime. If you hold it into perpetuity, just like Manhattan Island in New York was bought for $24 and now is worth $24 billion, 100 years from now your $3 billion to $4 billion will be worth $8 billion or $10 billion. It increases every year. It belongs to the people. Mrs. Reber and I would like to give it to the people.

You people frame up some way in which they can keep it. Don't let anybody try to change the Reber plan. I wouldn't permit anybody to change one iota of it. Somebody can show me an improvement and I will accept that. But no one has ever offered an improvement in the 25 years this has been before the public, or from the 7 million maps that are available.

Just a short time ago I had an inquiry from the port of London desiring to adopt some of the theories from the Reber plan to hold a tidal basin at any elevation of tide you wish and the same thing in Liverpool Harbor. They have a 40-foot tide. I can hold it at 40 feet all the time, or I can hold it at low tide.

Gentlemen, this is the offer of the Rebers. You have enough value here which we wish to give for you people to hold and manage from now to eternity. It is yours.

I thank you, Senator, very much, and certainly thank you for the help on getting the extra money.

(The data referred to by Mr. Reber follows:)

OUR PERPETUAL GIFT TO CALIFORNIA AND THE NATION—A MASTER PLAN FOR THE VAST SAN FRANCISCO BAY REGION

CREATING BILLIONS IN NEW WEALTH AND SUPPLYING ALL BAY AREA NEEDS

"I have studied the Reber plan for over 5 years and have seen no serious engineering objections or insurmountable difficulties. The advantages in water conserved, land areas developed, recreation facilities, transportation and dock facilities provided for, and many other advantages developed can be shown to exceed in value $3 to $4 billion."—Excerpt from letter to Bureau of Reclamation by L. H. Nishkian, C.E., dated October 10, 1945.

The Reber plan provides for California's coming millions and features solid land bay crossings and fresh water lakes.

CREATING "THE WORLD'S MOST MODERN AND EFFICIENT METROPOLITAN AREA"

"Mr. Reber's background as a schoolteacher and director of amateur theatricals stood him in good stead as he transformed San Francisco and the cities across the bay into the most modern and efficient metropolitan area in the world. It has been said of the Reber plan that 'it has everything'—and Mr. Reber proved this characterization is no mere figure of speech."—From McGraw-Hill's Engineering News Record by W. G. Bowman, editor, dated August 29, 1946.

SOME MILESTONES DURING 50 YEARS DEVOTED TO PLANNING

Planning begun 1907. Reber plan completed 1932. First quarter century spent gaining incomparable knowledge of California and its people.

1933: First formal showing of the Reber plan was to Hon. Herbert Hoover at his home on the Stanford campus.

1935: Resolution on Reber plan unanimously passed by Legislature of State of California. AJR No. 65.

1935: Secretary of War Dern's study of the Reber plan, and his decision: "The Reber plan is a military must." Secretary Dern's request for completion of statewide plan.

1936: Second conference with Hon. Herbert Hoover at Stanford Club, San Francisco. Subject: "What the Reber plan contains for the United States Navy."

1938: Statewide water and transportation plan completed.

1940: Exhibit of Reber plan at Golden Gate International Exposition under auspices California State commission.

1941—Sunday, December 21: California State Senate in special session passes resolution re the military features of the Reber plan. Resolution authored by Senator Arthur H. Breed, Jr., of Alameda County. S.R. No. 15.

1947: By directive of the Secretary of the Navy; officially informed "The United States Navy had the Reber plan on the drafting board during World War II."

1949: Conferences with General of the Army "Hap" Arnold.

1949: U.S. Senate Resolution No. 119, 81st Congress culminates in hearings held in San Francisco, December 8, 9, 10, 12, 15, and 16 before subcommittee of the Committee on Public Works, U.S. Senate, conducted by United States Senator Sheridan Downey (California) assisted by Senator Robert S. Kerr (Oklahoma). Testimony of more than 100 witnesses for Reber plan heard.

1950: (May) Act of Congress authorizing investigation.

1950: November 18 issue of Saturday Evening Post "told the whole world about the Reber plan" in feature story by Frank J. Taylor.

1951: Pentagon conference with the Hon. Dan Kimball, Secretary of the Navy.

1951: The Hon. Louis Bendetson, Undersecretary of the Army, arranges conference with officials of Army, Navy, and Air Forces; Pentagon, Washington.

1957, June 14: Dedication of bay model.

1957, August: Telegram from Congressman John F. Shelley stating "President Eisenhower signed into law H.R. 8090 appropriating $785,000 for continuation of investigation through fiscal 1958"; bringing total thus far appropriated by Federal Government to approximately $1,600,000.

1932 through 1957, second quarter century: Every day spent in educating the people anent the Reber plan via thousands of lectures, conferences, letters, articles, radio, and TV.

[From the San Francisco Chronicle, June 9, 1957]

THE MOST REMARKABLE ACRE OF CONCRETE IN THE WORLD

(By Harold Gilliam[1])

White-haired John Reber gestured vigorously out across the warehouse floor. "This," he said, "is the beginning of the greatest thing ever to happen to the State of California."

With a quick sweep of his arm he took in what may be the most remarkable acre of concrete in the world—the Army Engineers' scale model of San Francisco

[1] The writer, a former member of This World's staff, has recently completed a thorough study of the bay's past, present, and possible future, and his book, titled "San Francisco Bay," is scheduled for publication by Doubleday & Co. in October.

Bay, constructed to study the bay's tides and housed on the bayshore just north of Sausalito.

Directly in front of Reber, water was flowing out through a 5-foot-wide Golden Gate in a simulated ebb tide. Near Alcatraz, 20 feet away, a workman in rubber boots was sloshing around in midbay like some outsized Paul Bunyan, sending tidal-wave-sized ripples across the surface to crash against a concrete Angel Island and a concrete San Francisco on the far shore.

Reber leaned out over the Golden Gate, jabbed a gnarled finger into the ebbing current. "See that," he said. "There goes half of all California's water supply. Into the ocean!" He paused, frowning.

Nearby engineers tinkered with a big tide machine which was pumping water into the model to create half-inch tides, duplicating the bay's 24-hour tidal flow in exactly 14½ minutes. Over near Berkeley the sun, flooding through a skylight in the warehouse roof, sent brilliant spangles across the water.

Reber thrust his arm toward the far corner of the big room.

"All the water from the snows of the Sierra Nevada comes down to the delta over there. It runs through the bay and out the Golden Gate. But build the Reber plan and you put that under control. You conserve all the water California will ever need for all time to come." He stared down at the running water.

"That's what they're going to do, build a replica of the Reber plan, right here on this model, to find out how it would work. And I predict that it won't be long then before they start work on the plan itself, out in the bay, one of the greatest engineering projects in history!"

Although Reber has no official connection with the Army Engineers' model, probably more than any other single individual he was responsible for the construction of the model and for the multi-million-dollar survey of which it is a part. There are some who even say that Reber "preached the model into existence."

For a quarter of a century the dynamic former theatrical manager crusaded up and down California with all the fervor of a barnstorming evangelist on behalf of his gigantic master plan to remodel the bay. The Reber plan envisions two broad earthfill dams across the narrow necks of the upper and lower bay, controlling the river runoff and creating the world's two largest manmade lakes, connected by a ship canal along the east shore.

According to its author, in addition to ending California's water shortage forever, the plan would provide unlimited road and rail transportation across the bay and a fantastic array of other benefits, including a single terminal for rail, ship, bus, and airlines; thousands of acres of new filled land for factories and military bases; miles of warm-water bathing beaches.

So successful was Reber's one-man crusade that in 1949 a U.S. Senate subcommittee came out to San Francisco to see what all the excitement was about. At the subcommittee's hearing, Reber, the impresario, put on his greatest show—a "spectacular" starring himself with a supporting cast of dozens of witnesses, including engineers, civic leaders, public officials, farm chiefs, and high-ranking military experts, all of whom were of the opinion that the plan was the greatest thing since the Panama Canal.

The Senators were so impressed that Congress subsequently authorized a $2,500,000 5-year survey of the bay by the Army Corps of Engineers, including a study of the Reber plan. The survey was to include a scale model similar to the Engineers' successful models of the Mississippi Basin and eastern harbor areas.

After a delay caused by the Korean war, the engineers, under the command of Col. John A. Graf, San Francisco district engineer, went to work in the Sausalito warehouse and around the bay. They pored over charts of the bay and drew up blueprints for the model. They took hundreds of aerial photographs of the shoreline. They combed the bay in boats, with the help of the University of California and other agencies, probing the water with elaborate instruments, checking currents, sedimentation, and salinity.

At the warehouse, workmen poured concrete in 12-foot-square slabs, and engineers contoured each slab to match a portion of the bay bottom with accuracy to an eighth of an inch. Then they put the 158 5-ton slabs together like an acre-sized jigsaw puzzle, making a basin for the bay on a scale of 1 foot to a 1,000 feet horizontally, 1 foot to 100 feet vertically.

On the model, most of the channels of the bay were only a few inches in depth, but the Golden Gate had to be 3½ feet deep, and workmen had to dig a hole in the warehouse floor to accommodate it.

After more than a year's work, the last slab was put in place a few days ago. The engineers turned on the water and watched hopefully. The bay, which in nature took thousands of years to fill up, was created in the warehouse in a few minutes. The water—100,000 gallons of it—flowed into all the right places. No shoreline cities were flooded; no areas of the bottom were left high and dry. Painstaking accuracy had paid off.

Next Friday afternoon the model will be formally dedicated. Then the engineers begin many months of testing to be sure that its tides duplicate those of the bay in every respect. If not, the engineers will trim or bend some of the 5,000 vertical copper strips—each a few inches high—that have been set into the bay bottom to slow down the flow of water.

They will dump 17 tons of salt into the model's "ocean" outside the Golden Gate to duplicate natural salinity. They will pump fresh water into the model at the delta to correspond to the flow of the Sacramento and San Joaquin Rivers from the Sierra. They will pour quantities of black powdery stuff called gilsonite into the water to simulate the sediment brought down by the rivers. And they will insert concrete blocks corresponding to Reber's dams to see what happens—whether, as Reber's opponents contend, his lakes will fill up with silt or obstruct shipping or provide water too salty to drink.

It will be about 2 years before any final report will be made on the Reber plan. Meanwhile, 69-year-old John Reber will doubtless continue to prowl the warehouse floor, fascinated by the operations of this indoor bay, much as he once as a young man paced the hills overlooking the bay itself, formulating the elements of his plan. Here, he is convinced, his long crusade to remake San Francisco Bay will be finally vindicated.

For 100 years San Francisco Bay has been one of the most famous bodies of water in the world, but the unique complexities of its inner workings, hidden by its opaque surface, have been almost unknown. When the scheduled investigations are finished—some time after 1960—the bay will be one of the world's most thoroughly studied harbor areas, shedding new light on the whole science of hydraulics.

"SAN FRANCISCO BAY," BY HAROLD GILLIAM

"San Francisco Bay" carries the reader along on a swift current of interesting and revealing facts about the bay's colorful islands from Alcatraz to Yerba Buena, its rockbound lighthouses and hoarse-voiced foghorns, its yachts and pleasure craft, its cargo-laden ships from the colorful ports of the world, its famous people from Joseph Strauss, who built the Golden Gate Bridge, to John Reber, who wants to remake the bay itself.

STATEMENT FROM OFFICIAL ARMY ENGINEERS' SAN FRANCISCO BAY MODEL DEDICATION NOTICE

This dedication marks the completion and initial operation of the U.S. Army Engineers' San Francisco Bay model. This is an acre-sized $400,000 working hydraulic model which is a major tool in the 5-year comprehensive investigation of needs of the San Francisco Bay area.

The overall study was authorized by the Congress of the United States in 1950 based on U.S. Senate Resolution No. 119, 81st Congress, resulting from hearings on the Reber plan in San Francisco, December 8–16, 1949.

This study is concerned in part with navigation, flood control, salinity repulsion, shoreline transformation, harbor expansion, land reclamation, industry, agriculture, rapid transit, water supply, solid land bay crossings, fresh water lakes, residential development, recreation, and military and civilian defense.

[From the Denver Post, July 11, 1957]

BIG PROBLEMS CALL FOR BIG PLANS

A new report from the U.S. Geological Survey on the water crisis facing San Francisco points up one of modern man's most ambitious undertakings—the attempt to harness San Francisco Bay.

Every year half of California's water flows unused into the Pacific Ocean through the Golden Gate. This wasted water is twice the volume of the Colorado River, which Los Angeles and San Diego already tap with a 593-mile aqueduct system.

San Francisco itself reaches 150 miles to Hetch Hetchy Reservoir in Yosemite National Park for municipal water. According to the new USGS report, the city by the Golden Gate has fully developed its local water supply, including wells and small streams.

In releasing the USGS findings, Interior Secretary Seaton warned that San Francisco, now the Nation's seventh largest metropolitan area with a 2,240,000 population, will have to look to outside sources of water if it is to continue to grow.

But there is another hope, fantastic as it may sound—the so-called Reber plan to dam up San Francisco Bay. Two massive structures spanning the bay from San Francisco to Oakland, and from Richmond to San Rafael, would keep the salt water out and store fresh water from the Sacramento, San Joaquin, and other rivers in two reservoirs each as big as Lake Mead.

Mr. John Reber, a retired actor who has been talking up his plan for over 25 years, says the harnessing of San Francisco Bay could provide enough water to supply the needs of everyone on earth. That's theoretical, of course, and perhaps stretching things a bit, but certainly it should be enough water to supply the needs of booming California, and then some.

While the Reber plan hasn't been easy to sell, U.S. Army Engineers are now completing a football-field scale model of the proposed project at Sausalito, Calif., near the tip of the Marin Peninsula.

So far Congress has appropriated $800,000 for a 5-year study and working model of the Reber plan, as Mr. Reber has outlined it in 1,400 speeches to over 1 million people. The total study costs are estimated at $2 million, and the full survey won't be finished for another 2 years.

All this is interesting enough to Coloradans fearful of increasing California demands on the Colorado River. But there is a deeper moral: the American people must start thinking in fantastic terms about water. No longer can we afford to scoff at plans that dwarf the imagination. As President Eisenhower declared in his state of the Union address this year, "Water is fast becoming our most valuable resource."

More than that, it is the one limit to the continued growth of the Nation, and every State, county, and city in it.

The Reber Plan

The Reber plan is really a three-part subject, as it combines (1) a master plan for the San Francisco Bay metropolitan region with (2) a statewide water and transportation project affecting both northern and southern California, and (3) contains basic military necessities for the Armed Forces and civilian populations.

Using God's own materials—rock and earth (30 million tons of rock for the breakwater-type skeleton-perimeter, and 800 million cubic yards of dredged fill)—the Reber plan would unify the San Francisco Bay area by land linking both the Marin and San Francisco Peninsulas with the mainland of Contra Costa and Alameda Counties, respectively, with earth-and-rock dams each about 4 miles long, and each having the dual purposes of water conservation and providing arterials for transporting automobiles, rapid transit, railroads, and military equipment across San Francisco Bay; which, combined with land fills along the east bay shore connecting the two transbay dams, and bisected by a ship canal, would transform about seven-eighths of the 320,000-acre area of San Francisco Bay into twin fresh-water lakes; and with the lower lake receiving its supply of water from the upper lake via the ship canal. Spillways in the upper dam, ship locks, underpass traffic tubes, and fishways complete the physical works.

God's own materials—rock and earth—cost nothing. Nor would the God-made 280,000-acre reservoir for fresh water made from the basin of San Francisco Bay cost anything, as it already exists; and Walker R. Young (who should know) estimated that the twin lakes of the Reber plan would have a capacity of about 10 million acre-feet of water, and 10 million acre-feet of water is as much water as is today impounded behind all dams which have thus far been built in California. And 280,000 acres of fresh-water lakes would be twice the size of Lake Mead behind Hoover Dam; thus twice the size of the biggest man-made lake ever built in America.

Transforming seven-eighths of the tidal basin of San Francisco Bay into twin fresh-water lakes extending about 150 miles from their southern extremity near San Jose to the tidal limits in the Sacramento River some 10 miles north of

Sacramento, and to the tidal limits in the San Joaquin River some 15 miles south of Stockton, would not only automatically solve all the water problems of the 12 counties which would border on these twin lakes—Marin, Sonoma, Napa, Solano, Yolo, Sacramento, San Joaquin, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco—but would provide right in the very heart of the San Francisco Bay metropolitan region a fresh-water recreational playground for fishing, boating, and warm water bathing beaches unsurpassed in any other metropolitan area anywhere, and within but a few minutes of everyone who will ever live in the bay region.

But these twin fresh-water lakes also create right in the very heart of California this biggest of all fresh-water lakes; and thus create the key to the solving of just about all of California's water problems; because into these fresh-water lakes on its way to the ocean would continuously pour the entire runoff of the Golden Gate drainage basin of California, which includes two-fifths of California, or 40 million of California's 100 million acres which have their lone outlet to the sea via the Golden Gate.

Now according to State figures, the average annual runoff of the Golden Gate drainage basin exceeds 36 million acre-feet of water; and 36 million acre-feet of water amounts to 12 trillion gallons of water; and 12 trillion gallons of water is enough water to supply the domestic needs of every human being in the entire world, as 12 trillion gallons would furnish each of the 2.4 billion people who live in the world with 5,000 gallon of water annually; 12 trillion gallons is much more water than California can possibly use.

However, here are some more interesting facts few realize:

(1) That out through the Golden Gate flows the fourth largest volume of water flowing into the sea within continental United States; that only the Mississippi, the Columbia, and the Mobile Rivers carry greater volumes.

(2) That no river along the Atlantic coast of the United States from Maine through Florida carries nearly as much water to the sea as flows out through the Golden Gate right here in California.

(3) That the amount of water draining to the sea via the Golden Gate represents more than one-half of all the water California owns and possesses.

(4) That more water drains out through the single hole of the Golden Gate than flows into the Pacific Ocean through all the other streams in California all the way from the Oregon line to the Mexican border.

(5) That a mere fraction of the water now wasting into the ocean via the Golden Gate can solve all of California's water problems.

(6) That as to the quality of this water, 95 percent of it originates in the Sierra Nevada Mountains, and no purer water can be found anywhere in the world.

Now by merely exercising plain ordinary common everyday horsesense, and by utilizing the twin lakes of the Reber plan as the horse trough—merely pumping from the lakes but a mere portion from the continuous inflow of the rivers—all of California's major water problems can be solved in the most economical, the most practicable, and the most certain manner, and without infringing on a single county-of-origin or area-of-origin water right. Saving—as the Reber plan would—the fresh water squandered to control salinity in the delta (estimates of the amount vary from 3 to 6 million acre-feet annually), would give southern California more water than they could possibly use.

The 42-mile rock wall perimeter of the Reber plan on water 50 feet deep would expand harbor facilities resulting in the second largest harbor in all the world (New York leads); while those 20,000 acres of created lands along the east bay shore would be somewhat similar in shape and a little larger in size than New York's Manhattan Island which, purchased from the Indians for $24 worth of beads, has a present-day value—with improvements—of about $24 billion, or a billion to one over the original investment. The potentials of these 20,000 acres for a grand central passenger station, downtown airports, commercial and industrial development, expositions, sports stadium, and military establishments are next to unlimited.

All admit our glorious Nation is in grave peril.

The two solid land transbay dams of the Reber plan have been declared military musts by a Secretary of War due to their accomplishing two basic military necessities for both the Armed Forces and civilian populations:

(1) Indestructible transbay transportation.

(2) A guarantee of a wartime water supply no enemy can destroy.

These solid land transbay dams can be built so huge as to be indestructible in wartime.

Expanding the Reber Plan Statewide—Offering a Master Water and Transportation Plan for All of California

(Some observations by John Reber)

You may decide you deem this planning to be the greatest intrastate water and transportation planning ever created for any of the 48 States.

MILITARY BENEFITS

This planning has tremendous potentialities for the defense of the west coast, as was acknowledged by Secretary of War Dern in December 1935, to whom this planning was originally outlined. The planning aims to provide two basic military necessities for both the Armed Forces and the civilian populations. These are:

(1) A supplemental water supply for the Metropolitan Los Angeles area which, although not positive in its guarantee of indestructibility—as is the Reber plan guarantee of water for Metropolitan San Francisco—certainly can be defended, and surely is far less vulnerable than the aqueducts supplying Metropolitan Los Angeles with waters from Owens Valley and the Colorado River; and

(2) An entirely new transportation arterial connecting southern California with northern California which would augment the inadequate (and extremely vulnerable) existing transportation with its numerous tunnels on single-track railroads on the coastal route or through the Tehachapi Pass, and the vulnerable coastal and valley highways where they parallel these railroads.

OUTLINE OF THE PLANNING

The planning proposes a combination of a canal and transportation arterial down the west side of the San Joaquin Valley at an elevation about that of the railroad and highway down the east side of the San Joaquin through Modesto, Merced, Fresno, Tulare, and Bakersfield, in order that all lands in between may be irrigated by gravity from the canal. A tunnel through the Tehachapi would carry water to southern California; and eventually railroads and highways may also go through the Tehachapi in tunnels. The canal would divide the superturnpike, with southbound traffic on its west side and northbound on the east side. Material scooped out to form the bed of the canal would be spread east and west from the canal bed to provide the roadbeds for the transportation arterials.

This planning has been the subject of study and discussions for more than 20 years. It is the first planning ever brought forward to take water south of the Tehachapi. Thus far this planning has been found devoid of engineering flaws.

SOME OF THE FEATURES OF THE PLANNING

(1) It provides the shortest possible route between the two major metropolitan areas of San Francisco and Los Angeles.

(2) The transportation arterial traverses the hot San Joaquin Valley, but can be automatically air cooled.

(3) All water would be pumped, and thus this could be the first great big job for atomic energy.

(4) This highway of the future should cause that the automobile of the future could make the trip between the metropolitan areas of San Francisco and Los Angeles in as little as 5 hours.

(5) There is plenty of right-of-way for railroads and passenger trains of the future should be able to make the trip between the metropolitan areas of San Francisco and Los Angeles in about 3 hours.

(6) Not to be overlooked should be consideration of using the canal for barge traffic from the bay region south through the San Joaquin to Kern County; and where economic justification for barge operation is shown in the United States, the Government provides for same.

(7) The superturnpike would cost nothing; as its cost could come from California's share of the $33 billion Federal Highway Fund.

(8) The canal is actually an extension of the twin lakes of the Reber plan, augmented by pumping plants; and since the lakes of the Reber plan have a capacity of 10 million acre-feet of water, investigation may prove that no immediate reservoirs to assist in carrying water south (as are proposed in all other

plans) would be necessary. Should investigation support this, and find it unnecessary to construct San Luis Reservoir, the saving of the $305 million cost of San Luis Reservoir would just about pay for this entire project.

(9) This is the lone planning to carry water south which has no legal ramifications; as it conflicts with no area-of-origin and/or county-of-origin water rights.

(10) Should this planning prove sound, water for the Los Angeles area should not cost in excess of $10 per acre-foot; and water for the San Joaquin not more than an average of $4 per acre-foot.

(11) By merely saving (as the Reber plan would do) those millions of acre-feet of water now annually used in a futile effort to push back the ocean to provide salinity control in the upper bay and delta regions, and transporting this water to southern California, southern California could secure more water than they could ever use.

(12) This planning is aimed to accomplish California's water and transportation problem in one mammoth undertaking; but the cost to do the whole job is far less than the cost to do even a portion of it piecemeal.

The writer is more or less acquainted with the sincere proposals brought forward by Charles M. Weber and Bill Wiley for solving California's water problems, as well as plans advanced by the State of California. The goal of all planning should be to finally result in the construction of what will do the greatest overall good for California and the Nation. Thus all plans deserve a complete investigation, as well as a complete economic evaluation; for it is only by such scientific analysis that that best of all possible jobs can be attained.

One thing about which we can all be certain is that California will never solve its water problems by politics; because what is required is water.

COST ESTIMATE

Nishkian Engineering has made 5 separate cost estimates for the Reber plan; $120 million in 1940; $200 million in 1946; $245 million in 1949; $340 million in 1956; and $380 million in 1957—as of today. Thus construction costs have advanced more than threefold in 17 years.

No such accurate estimate has been made for expanding the Reber plan statewide; but all preliminary estimates show it would be less than for the Reber plan; and bring the total for both to less than three-quarters of a billion dollars.

[From the Commonwealth, Aug. 8, 1955]

PROPOSED CALIFORNIA WATER PLANS (REPORT OF AGRICULTURE SECTION)

(By Jack Pickett, junior past chairman, agriculture section)

At the very first meeting of the Commonwealth Club of California in 1903, it was suggested that water might be a very timely study to be made by the club. Since that time the Commonwealth Club has devoted much time and study to 32 reports on the subject.

In the present study the agriculture section has listened to the testimony of a number of men who have devoted a good part of their time and knowledge to water development. We will discuss the testimony of our experts in the order in which they appeared before our group.

REBER PLAN

First speaker was John Reber, who has appeared before the club many times. Quoting Reber:

"That eminent engineer, the late great L. H. Nishkian, graciously gave of his talents to the Reber plan during the 7 years prior to his untimely death; and made the first cost-estimate of the plan when the California Commission to the Golden Gate International Exposition arranged for its exhibition at the Science Auditorium of the Science Building during the final portion of the 1940 (second) year of the exposition. Nishkian's cost-estimate totaled approximately $120 million. This $120 million estimate Nishkian revised for the Army-Navy Board hearings in 1946, and found that rising costs, due to the war, had upped his original estimate to $200 million. After Nishkian's death, 15 engineers who associated themselves with the Reber plan and were witnesses before the hearings held by the United States Senate subcommittee revised Mr. Nishkian's 1946

figures and found that costs had advanced where by December 1949, the cost-estimate was $245 million. Costs have not altered much since; in fact, earth-moving costs have, because of greater efficiency in earth-moving machinery, actually gone down.

"No cost estimate of that portion of the Reber plan which would supply areas outside the San Francisco Bay region with water, plus constructing the super-turnpike between the two great metropolitan areas of Los Angeles and San Francisco, has ever been made in as detailed a manner as Engineer Nishkian prepared the cost-estimate for the bay region construction.

One hundred and seventy to two hundred and fifteen million dollar estimates for non-bay area proposals

"Such preliminary estimates as have been made reveal cost-estimates varying from $170 million to $215 million. That estimate would construct the super-turnpike, and the water-distribution systems supplying water to the following counties: Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern in the San Joaquin Valley; to the metropolitan areas of Los Angeles, Riverside, San Bernardino, Orange, San Diego, Ventura, and Santa Barbara in southern California; and to the four central coastal counties of San Benito, Santa Cruz, Monterey, and San Luis Obispo.

"The 12 bay region counties which would border on the twin fresh water lakes of the Reber plan, would automatically have their water-supply problems forever solved; and these 12 counties are: Marin, Sonoma, Napa, Solano, Yolo, Sacramento, San Joaquin, Contra Costa, Alameda, Santa Clara, San Mateo, and San Francisco.

Federal features

"When in Washington lecturing at the Pentagon on the Reber plan, it was outlined to me that 'whenever California is ready, the Federal Government is ready' to go over the Reber plan from the standpoint of determining the value of those objectives in the Reber plan which are Federal; and therefore, of aid to the entire Nation; and it was said that our Government would pay for those strictly Federal benefits. I said, 'It will be found that more than one-half of the benefits of the Reber plan are Federal'—to which they replied, "We know that.'

"Not only Commonwealth Club members, but all Californians should realize here is planning aimed to accomplish great and everlasting good for California—and to our Nation as well—and that our Nation extends an offer to pay their share of its cost. 'No,' there would be 'no strings attached' * * * I inquired about that."

REBER SAYS HIS PLAN WILL SOLVE BOTH WATER, TRANSPORTATION PROBLEMS

"The solid land eath-and-rock-fill type crossing is the only one which will handle all land traffic including railroads, rapid transit, and automobiles, and solve the transbay transportation problem for all time," John Reber, author of the Reber plan, said in a recent talk to the agriculture section.

"The solid land crossings of the Reber plan provide dams for water conservation and distribution as well.

"One-half of all the water the State owns flows into the ocean, through the Golden Gate, and is forever lost.

"The average annual amount of water flowing into the ocean through the Gate is the fourth largest volume flowing to the sea within the continental United States. Only the Mississippi and Columbia Rivers, and the 40-mile Mobile River, carry more water to the ocean. It amounts to about 35 million acre-feet. This is the equivalent of 12 trillion gallons. This is enough to supply the 2.4 billion people of the world with about 5,000 gallons every year, or 12 gallons every day. Surely this is enough to supply the needs of California.

Eight-point Reber program

"The eight point water supply program of the Reber plan is this:

"(1) Guaranteeing the entire Sacramento Valley all the water it will ever require prior to taking any water whatsoever from the Sacramento Valley for use elsewhere.

"(2) Supplying the San Francisco Bay region with all the water ever required for every need for all time.

"(3) Supplying the seven counties of the San Joaquin Valley with all the water required for full development of every acre in the entire valley.

"(4) Via a tunnel through the Tehachapi supplying Los Angeles and San Diego with all the water they will ever require.

"(5) From the Tehachapi tunnel, a cutoff to supply the Ventura and Santa Barbara areas.

"(6) From the south lake of the Reber plan, supplying San Benito, Santa Cruz, Monterey, and San Luis Obispo Counties with all the additional water they will need.

"(7) Replenishing the underground water basins from which water is pumped, and holding these underground water basins 'full-up.'

"(8) Providing a wartime guarantee of water no enemy can destroy."

LEST WE FORGET

Ever since those U.S. Senate subcommittee hearings, there has been no end of comment regarding that board of experts which appeared as witnesses for the Reber plan. Many claim they constitute just about the most capable array of talent ever to support any project anywhere. Their many activities in their various professions included knowledge of every facet in the many ramifications and objectives of the Reber plan.

Individually and collectively they were experts. Many were retired after a service of from 35 to 50 years in their chosen professions; and with experience nationwide and worldwide. Of them, the U.S. Senators said, "Never before any U.S. Senate hearing have we seen a finer quality of witnesses than are appearing in support of the Reber plan."

The usual procedure in enlisting professional talent is to hire the talent on a per diem basis which often ranges from $100 to $300 per day. But this Reber plan board of experts were not hired. You could not have hired them. They volunteered. They gave their expert knowledge for the benefit of the San Francisco Bay region, California, and the Nation, because they believe in the Reber plan.

The total time these experts devoted to their professions adds up to an astounding 1,000 years. Such is the caliber of the gift the people received.

California and the Nation owe their debt of gratitude to the following:

To L. H. Nishkian, acknowledged "among the top four engineers of America," for his 7 years of devotion as chief engineer for the Reber plan; 1940–47.

Alphabetically set forth, to the following members of the Reber plan board of experts:

Capt. Lawrence J. Archer, USNR (retired), Department of Public Work, City and County of San Francisco.

Capt. George M. Baum, USN (retired), battleship commander.

Brig. Gen. Philip G. Bruton, USA (retired), division engineer, U.S. Army Corps of Engineers; authority on harbors.

John J. Casey, former chief engineer, city and county of San Francisco.

Robert E. Cornish, chemical engineer.

Paul J. Cushing, C.E., president, Hydraulic Dredging, Ltd.

Vice Adm. John W. Greenslade, USN (retired), commander, Western Sea Frontier, World War II.

Prof. George L. Green, geologist.

Herbert F. Harrold, chief engineer, Alameda County Water District.

Ray T. Hess, CAA (retired), airport engineer.

G. W. Hunt, chief engineer, Santa Clara Valley Water Conservation District.

R. F. Kelker, Jr., C.E., transportation analyst.

Theodore M. Kuss, consulting engineer.

Warren H. McBryde, consulting engineer specializing in industry.

Capt. C. S. McDowell, USN (retired), president, Intercontinental Engineering Corp.

Byron L. Nishkian, consulting engineer.

Arthur O'Leary, nautical scientist.

John E. Pickett, expert on agriculture.

Josephine Randall, nationally recognized authority on recreation.

John M. Server, Jr., engineer-editor.

Capt. O. W. Swainson, U.S. Coast and Geodetic Survey (retired), supervisor, western district, U.S. Coast and Geodetic Survey.

Rear Adm. Henry G. Taylor, USN (retired), district civil engineer, 12th Naval District, 1938–42.

William B. Taylor, consulting engineer.

Prof. Earl G. Thomas, consulting engineer.

Walter J. Walsh, electrical engineer.

Capt. E. D. Washburn, Jr., USN (retired), Pacific convoy commander, World War II.

William Q. Wright, engineer-geologist, authority on Sacramento-San Joaquin Delta.

[From the Bakersfield Californian, Jan. 30, 1952]

REBER PLAN WATER FOR DRY KERN LANDS SEEN—PROPOSAL TOLD IN TWO TALKS TO COUNTY FOLK

Water for Kern County from the San Francisco Bay was the dream held out to Kern residents by John Reber, father of the controversial Reber plan for development of the bay.

Reber spoke before the East Bakersfield Progressive Club in the House of Rasmussen last night and before the Shafter Twenty-Thirty Club the night before.

His talk to the East Bakersfield Progressives, W. I. Hanks of the club reported, was scheduled to be for 25 minutes but at the end of the allotted time those attending urged him to continue for another half hour.

ORIGINAL PLAN

Water for Kern County and possibly the Los Angeles area is one of the outgrowths of Reber's original plan for the bay.

He reported the Sacramento River to be the third largest in the United States but the State is permitting the fresh water to go wasted into the ocean. Dams would make fresh water lakes with great enough water supplies to irrigate the San Joaquin Valley, he said.

Water would be carried down the valley in a huge irrigation canal. If it were to be taken on down to the Los Angeles area, his plans call for a canal to be put through the mountains.

FIRST PROBLEM

Water is the first problem facing Californians, said Reber, and transportation the second. His plan would combine the two.

The Reber plan consists of two earth and rockfill dams (or moles) crossing San Francisco Bay, the lower connecting San Francisco County and Alameda County, and the upper connecting Marin County and Contra Costa County (Richmond and San Quentin); a ship channel along the east side of the bay extending from Alameda to Pinole Point; a hydraulic fill of the shallow east shore of the bay over a 3-mile width and 13 miles in length, and one or more multiple-ship locks between the bay and ship channel.

San Francisco Bay would be divided into three parts. The central portion between the two dams and west of the created lands would constitute the deep salt water harbor.

The portion of the bay south of the lower dam and the portions of the bay north of the upper dam and including San Pablo Bay, Carquinez Straits, Suisun Bay and the delta channels would be transformed into fresh-water lakes.

TWIN LAKES

Connected by the fresh-water ship channel, these two large fresh-water bodies acting as "twin lakes" would receive their water supplies from the Sacramento-San Joaquin River systems of the Central Valley of California as well as from the lesser rivers and streams of the bay basin.

It is proposed to hold the surface elevation of the fresh-water lakes about high tide, this being controlled automatically by siphon spillways of the upper dam.

Highway and railroad crossings of the ship channel would be by means of subsurface tubes or subways.

The plan provides for some 20,000 acres of newly created land. All material for the hydraulic fill to create the 20,000 acres of new lands in what are now mudflats and shoal waters along the east bay shore would be pumped by suction dredge from the bottom of the bay. Double benefit will result—new lands created from now worthless territory and nonnavigable shoal waters deepened and made navigable.

TRAFFIC SOLUTION

The south mole, 2,000 feet wide, linking San Francisco Peninsula to the Alameda mainland would carry both adequate highway and railway systems for high-speed traffic.

Passenger train yards could be accommodated on the mole adjacent to a grand central terminal if such facilities seemed desirable.

The superfreeway proposal for the San Francisco-Alameda County land link would consist of possible four separate six- or eight-lane divided motor expressways.

Now under consideration is a second bridge across the San Francisco Bay to accommodate traffic. Estimated cost of such a bridge is in excess of $200 million.

Recent storms, pointed out Reber, have shown the confusion resulting when the bridges are not usable. Saboteurs, he said, could eliminate use of the bridges during an attack by a foreign enemy.

However, he said, his proposed land moles could not be bombed out. He pointed out that military authorities in Washington were impressed with his plan.

SAN JOAQUIN PLANS

Reber also told of his plan for a superfreeway connecting San Francisco and Los Angeles combined with a west side San Joaquin Valley irrigation canal.

He reminded that 90 percent of Californians live in either San Francisco or Los Angeles metropolitan areas. A turnpike from San Francisco to Los Angeles, designed in a straight line down the west side of the San Joaquin Valley could be combined with a fresh water canal from the bay area.

Reber was questioned following his "chat" (he says he does not orate, only chats) as to the total cost of his plan. He replied changing construction costs would make it impossible to name the exact cost, but pointed out the assets derived from the plan—deep-water harbor in San Francisco Bay, rail and highway facilities to accommodate civilian and military purposes, the nondestruction by bombing of his mole-type transportation across the bay as compared with bridges which must be closed even during bad storms.

ENGINEERING COMPLETED

Questioned as to the next move, Reber told his listeners that the plan was past the engineering stage. He advised them to write or contact the Governor and representatives in the State legislature and urge them to consider the Reber plan before contemplating any more bridges across San Francisco Bay. The bay, Reber said, belongs to the people of California.

[From the Los Angeles Times, Nov. 7, 1951]

REBER OUTLINES PROPOSAL FOR DAMS, LAKES, CANALS—PROMOTER WOULD TRAP FRESH WATER IN NORTH TO BE CHANNELED TO LOS ANGELES AREA

John Reber, the 63-year-old San Francisco amateur theatrical producer who first conceived and then gained support for probably the most staggering public works project in all the West's history, arrived here yesterday to exploit his proposal.

He came in on the Santa Fe Chief from Washington, where he's been busy doing the same thing. He's been at it for 16 years. During that time, he says, he has enlisted scores of the State's best engineers, wealthiest men and most prominent civic leaders as backers of his Reber plan for the San Francisco Bay.

TWO FRESH WATER LAKES

The proposal includes far more than its original and basic premise of building two earth and rockfill dams across fingers of San Francisco Bay to create two vast fresh water lakes.

The dams would trap millions of acre-feet of water each year, under Reber's plan. Much of this surplus runoff, under the full scope of his proposal, would be channeled southward to the Los Angeles area in a superirrigation canal as wide as the Los Angeles River, to provide the southland with what Reber envisions as a never-ending water supply.

The program includes a proposed turnpike without stops or intersections over the 350-mile airline distance between Los Angeles and San Francisco, complete with special trucking lanes and railroad rights-of-way.

PUMPING STATIONS ALONG WAY

The water channel and highway would be on a straightline route with pumping stations raising the water level at necessary points along the way until the foot of the grapevine grade near Bakersfield.

Then the plan envisions a tunnel under the Tehachapi, delivering northern California water and traffic squarely into the heart of Los Angeles.

Reber said yesterday that he was "greatly encouraged" by his Washington reception. He talked to Under Secretaries of Army, Navy, and Air Force; to the Bureau of Reclamation of the Department of Interior, and to nearly a score of other Federal officials. He said he found all interested in his superplan to solve half of California's troubles in one great stroke.

He's going back to the Capital again in January. Then, Reber says, the California congressional delegation plans to arrange a meeting of Government officials concerned with possible adoption of the Reber plan.

Reber said he thinks that his vast program will finance itself. The increased ocean and fresh water shipping facilities given to San Franciso Harbor will go a long way to defraying that part of the cost.

Then his two dams across fingers of the present bay will be substituted for bridges or other means of crossing the bay. Tolls charge, as with the bay bridges, will care for that portion of the cost, Reber believes.

The ardent San Francisco planner said he will be here until Friday. He is staying at the Biltmore.

Senator KUCHEL. Thank you very, very much, Mr. Reber. We are delighted to hear from you.

Unless there are any further witnesses in the audience, the Chair is ready to adjourn, and we will meet tomorrow in Los Angeles.

(Whereupon, at 3:55 p.m., the hearing was adjourned.)

WATER RESOURCES

FRIDAY, OCTOBER 16, 1959

U.S. SENATE,
SELECT COMMITTEE ON NATIONAL WATER RESOURCES,
Los Angeles, Calif.

The select committee met at 9 a.m., pursuant to Senate Resolution 48, in the Police Facilities Building, Los Angeles, Calif., Senator Thomas Kuchel (vice chairman) presiding.

Present: Senators Kuchel, Engle, and Young.

Present also: Theodore M. Schad, staff director of the select committee, and Paul McBride, chief clerk.

Senator KUCHEL. The meeting of the U.S. Senate Select Committee on Water Resources will come to order.

By way of introduction I would like to say that with this meeting in Los Angeles the first series of hearings by the select committee will have been concluded. There will be three more series to be held subsequently this year.

I think one of the outstanding pieces of legislative accomplishment in this last session was the creation by the U.S. Senate of a select committee to inquire into the availability of water in this country, the needs of our people projected into the future, and beyond that, the committee was empowered to make recommendations in the whole field of water resources and water problems to the Senate when it expires early in 1961.

I have had the honor of listening to people all across the country, in Oklahoma, North Dakota, Wyoming, Montana, and now here in California.

Certainly, my colleague, Senator Engle, and I are fully agreed that the problems we have in this State, unique as they may be to us, are duplicated in almost every State in the Union, and in some areas I must say problems of water are more serious. I will take a few seconds for one example.

The people of North Dakota, represented by Senator Young, who will be a little late this morning, as he is not feeling well, need additional water from the Missouri River, an interstate stream which goes through the State of North Dakota as it winds its way southward. The Governor of the State of Montana is objecting to the people of North Dakota using any more water from the Missouri River by way of diversion across some of the hills and valleys of that State for additional use.

It does seem to me what our forebears were able to accomplish a generation or more ago in the final agreement on a Colorado River compact, with all its difficulties of interpretation, nevertheless represents real progress because at least when the Supreme Court decides

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what the language means we will abide by it, whereas in the Missouri Basin there is no agreement on just exactly how water shall be used.

My able California colleague, my friend of years, is, like myself, a member of this committee, and I would first like to ask Senator Engle to speak briefly with respect to his concept of California's and the Nation's problems in this field.

Senator ENGLE. Thank you very much, Mr. Chairman.

STATEMENT OF HON. CLAIR ENGLE, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator ENGLE. I certainly agree with you that the establishment of this Select Committee on Water Resources was an important piece of work by the last Congress. For the information of those who may not know it, I would say that this committee consists of members from four different standing committees of the U.S. Senate: the Committee on Interior and Insular Affairs, which has jurisdiction over reclamation projects; the Committee on Public Works, which has jurisdiction over navigation and flood control; the Committee on Agriculture, which has jurisdiction over upstream watershed projects; and the Committee on Interstate and Foreign Commerce.

The broad spread of this representation was selected because we are dealing with very broad Federal problems with reference to future water developments.

Both Senator Kuchel and I serve on this committee, I as a member of the Committee on Interstate and Foreign Commerce and Senator Kuchel as a member on the Senate Committee on Interior and Insular Affairs. Senator Kerr, of Oklahoma, who was with us yesterday and had to return to Oklahoma, is chairman of this committee, and Senator Kuchel is vice chairman of the committee.

Our general purpose is to try to define the needs for water in the next 25 years and try to lay down the principles on which water would be developed to meet those needs, and to establish the relationship between Federal Government and the State and local governments with reference to water development programs.

So that is a pretty big order. We realize, of course, that there is a good deal of conflict and overlapping in the present water programs. There is no real uniformity about those programs. We think we ought to have more uniformity. We are out to hear what you have to say—and many of you have had a lifetime of experience in this water business—with reference to what kind of uniformity ought to be established in Federal programs, who should do what, and who should pay for what in the water development.

I think perhaps California will be a very vital factor affecting some of the decisions that are made nationally. There is a great effort being made here to develop a very great water program. Senator Kerr, of Oklahoma, was very much impressed at the meeting yesterday with the planning, the imagination, and the vigor that has gone into California's water program. He, of course, does not know much about the details of it, but he wanted to learn about it because there has not been anything like it in the United States.

What we do here in California with reference to our own water development program might set the guidelines somewhat as to the

kind of action that will be taken elsewhere in the United States; and the sort of relationship that we establish with the Federal Government in connection with our own water program may also have a very significant effect upon the kind of Federal water program that we will have throughout the Nation.

So, California is important in this water picture just as water is important in California. And there is no place, I would suspect, where the committee will get more illuminating information with respect to all of these very difficult problems than right here in our own State.

So, your contribution to the record is going to be very helpful to us, not only to Senator Kuchel and me, and Senator Young when he gets here, but the record will be very helpful to this committee in formulating the basic policy statements which we hope to come up with when we file the final report of this committee.

Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you, Senator Engle.

The first witness is Mr. Joseph Jensen, the chairman of the board of directors of the Metropolitan Water District of Southern California.

We are delighted to welcome you, Mr. Jensen, as a very distinguished and able citizen in this field of caring for water needs.

STATEMENT OF JOSEPH JENSEN, CHAIRMAN OF THE BOARD OF DIRECTORS OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Mr. JENSEN. Mr. Chairman and members of the Senate Select Committee on National Water Resources, my name is Joseph Jensen. I am chairman of the board of directors of the Metropolitan Water District of Southern California, a municipal corporation engaged in the operation of an aqueduct system delivering water from the Colorado River to the service areas of the district, which now includes 85 incorporated cities and large unincorporated areas situated on the coastal plain of southern California.

I might interpose and say we have 18 copies of this statement with map attached for the committee and plenty of other copies without maps.

The CHAIRMAN. The map will be received and set forth after your statement in the record.

Mr. JENSEN. On behalf of the board of directors of the metropolitan water district, I desire, Senator, to express to you and to the members of your committee sincere appreciation of your courtesy in inviting a representative of the district to appear before you. We feel California is particularly fortunate in having both of its Senators on this committee and that they are so well informed that I doubt there is going to be any testimony that is going to be given to them that will be new to them. It may renew facts but it will not be new.

We deeply appreciate the large-scale studies your committee is giving to the basic and vital subject of water for people throughout the United States. We are sure that your studies will reveal that there is no measurable increase in the average quantity of water being made

available to the people of the United States by rainfall or snowfall. At the same time, the country's population is increasing at a tremendous rate. This means that there are each year more and more people needing water from developed or potential water sources that remain about the same in overall quantity. This brings us to realize, we respectfully submit, that water is a vital commodity that ought to be distributed in a manner that will do the most good for the greatest number of human beings. Here in southern California we have been fortunate in the leadership that has developed supplies, and with the fine understanding of the people of the community, because no project has been built without the consent of the people and by a majority vote.

I cannot pay too high tribute to the leaders of the Los Angeles Department of Water and Power who conceived the Owens aqueduct and in turn conceived the Colorado River aqueduct and took the first steps to implement it.

The Metropolitan Water District of Southern California is governed and carries forward its work in accordance with the provisions of the Metropolitan Water District Act, adopted by the California State Legislature in 1927, and since amended at succeesing sessions of the legislature. The district was organized in 1928. In 1931, the bottom of the depression, the peopple of the district voted to authorize a bond issue of $220 million to finance the construction of an aqueduct from the Colorado River to the cities and areas within the district; in 1941 the aqueduct, in its first development, was completed and began the delivery of Colorado River water.

The ever-growing importance of providing supplemental water to meet the rapidly increasing domestic, industrial, and municipal requirements of southern California's coastal plain is strikingly indicated by the growth of the district since it completed its Colorado River aqueduct in its first development in 1941. I might say, however, we have conserved the money of the bond issue and we are only now spending the last of the bond money of the $220 million voted in 1931.

In the summer of 1941, Colorado River water became available for use on the southern California coastal plain. In 1941 the district had an area of 608 square miles; in 1959 the area of the district is 3,200 square miles. In 1941 the districts population was 2,200,000; in 1959 it has a population in excess of 7 million, and we are annexing, probably it may be in the neighborhood of 3,300 and 3,400 square miles.

In 1941 the district had an assessed valuation of $1,900 million; in 1959 this assessed valuation has increased to more than $12 billion.

The metropolitan aqueduct is unique in that it is the first project in the world where water is being pumped over mountain divides. In our case we lift the water 1,600 feet or more.

About half the people living in California are residing within the boundary of the Metropolitan Water District of Southern California, and its assessed valuation represents almost one-half the total assessed valuation of the State.

Here in southern California we have had many years of experience in the development of large water-supply projects designed and successfully operated to deliver water for domestic and industrial use from sources far removed from the places of use. The development of these large water-supply projects has been made possible only

by the application of new and improved engineering methods and the willingness on the part of the people served to assume heavy financial obligations to assure the full repayment of the cost of the projects solely from their own resources and without Federal Government subsidies.

Southern California is a section of the earth where more people have come to live and work and play in a region farther removed from adequate water supplies than in any other part of the earth at any time in recorded history. Southern California, in common with the greater part of Southwestern United States, is a semiarid region.

The extreme aridity of the southern California climate is not immediately evident to the recently arrived resident or tourist, with only the luxuriant subtropical vegetation of the cultivated areas as a basis for judgment. The sharp contrast with the Sahara-like deserts that must be crossed by everyone approaching Los Angeles overland increases the impression of abundant rainfall, until the fact is finally realized that all this vegetation is continuously dependent upon frequent irrigation. The region constitutes in reality a great oasis, sharply bounded in every landward direction by deserts of utter sterility. It derives a limited and extremely variable water supply from the 1,000 square miles of rocky, steeply sloping mountain watersheds which drain into the basin from the north and east. On these mountain slopes the rainfall averages about 30 inches annually, but this rate decreases toward the ocean to only 15 inches at Los Angeles and about 10 inches at the beaches.

These figures for average rainfall, as is often the case with water-supply means, are themselves misleading, for one very wet year (with most of its runoff lost as floods into the ocean) outweighs several very dry years in computing the average. As nearly as may be determined from all available data, there have been during the 178 years of Los Angeles history approximately 100 years with less than average rainfall and more than 100 with less than average stream runoff. The median precipitation during the period has not exceeded 13.5 inches; that is, at least half of the years have yielded less than this amount of rainfall.

Official U.S. Weather Bureau rainfall measurements for Los Angeles are available only since 1877, but earlier records are available from nearby points, including Los Angeles Harbor from 1864 and Fort San Diego from 1850. By analyses of old flood records, mission crop reports, miscellaneous notes, diaries of early settlers, and other indirect means, H. B. Lynch, consulting hydraulic engineer of Los Angeles, has extended these records with reasonable dependability back to the year 1769. The results show that there has been no change in mean climatic conditions in southern California since that date at least, although drought periods are indicated that were both more severe (1822–32) and of longer duration (1842–83) than any that have occurred during the present century.

As southern California, more than 50 years ago, began steadily to move from a grazing and agricultural area to a horticultural territory with growing urban centers, it became increasingly evident that water supplies must be imported from distant sources to meet the increasing needs of its inhabitants. Today we are looking to new water sources in northern California more than 500 miles distant.

The longest and the largest domestic water supply line thus far planned, constructed, and placed successfully in operation is the Colorado River aqueduct of the Metropolitan Water District of Southern California. Since the people of California are more and more coming to realize that water is this State's most important problem, let us look at the basic elements that entered into the great job of bringing Colorado River water to the people, the industries, and the vital naval, air, and Army installations in the southwest corner of the United States of America.

The Colorado River is one of the major rivers of the United States and the largest river in the Southwest. Its main stream flows for 1,700 miles within the United States and 50 miles in Mexico, where it empties into the Gulf of California. With its tributaries, it flows through or forms the boundaries of seven States of the Union; namely, Colorado, Utah, Wyoming, New Mexico, Nevada, Arizona, and California. (I know that there are several members of this committee who are thoroughly familiar with the Colorado River and whose States are vitally concerned with the use of Colorado River water.)

The basin of the Colorado River covers one-twelfth of the entire land area of continental United States. It has a total area of 252,000 square miles, with 250,000 square miles within the Republic of Mexico.

In the lower 200 miles of its length the river passes down through relatively flat mesas and valleys. It is the only river with tributaries entirely within the United States which travels for the greater part of its course through desert country.

I have stated that the coastal plan of southern California is a semiarid region. Its average rainfall of less than 15 inches annually is not sufficient to support horticultural developments, to say nothing of the heavy requirements of cities and industries. And yet, we have in southern California today one of the great metropolitan areas in the world. This has been made possible by importing water from distant sources. As the largest city in southern California, Los Angeles was the first to feel the acute need for an additional supply of water to supplement its local sources. It met this need initially by building the Owens River aqueduct which was placed in operation in 1913 and delivered water to the city of Los Angeles from the eastern slopes of the Sierra Nevadas.

When the Owens River aqueduct was completed and began its delivery of water to the people of Los Angeles it was expected to solve the city's water problems for many years to come, but only 10 years later another drought proved its Sierra Nevada watershed inadequate to fill the aqueduct during the dry cycle. In 1923, the conditions which obtained prior to construction of the Owens River aqueduct were again imminent. Population growth had continued even more rapidly than before, with no prospects for an early decrease in rate of growth. But this growth in population and industrial development was not confined to the city of Los Angeles. Many other communities in southern California were exhausting their local water supplies and were urgently in need of additional water from outside sources. Areas in Los Angeles and Orange Counties were experiencing an alarming lowering of their water tables.

In 1923 the city of Los Angeles launched their first engineering survey for studies to determine the most economic and practical route

for an aqueduct from the Colorado River to the Los Angeles area. At the same time, there was being debated in Congress the Boulder Canyon project bill to authorize the building of a multiple-purpose dam across the Colorado River at or near Boulder Canyon. The Boulder Canyon project bill was adopted by Congress in the fall of 1928, and the dam it authorized is now known as Hoover Dam. In the same year there was organized in southern California the Metropolitan Water District of Southern California. As previously stated, the district now includes not only Los Angeles, but 84 other incorporated cities and large unincorporated areas extending into the five California counties of Los Angeles, Orange, Riverside, San Bernardino, and San Diego. After the district was organized in 1928, it took over in Los Angeles the engineering and administrative work on the Colorado River aqueduct project.

The first problem in the planing of the aqueduct was the selection of a general route. Factors influencing such a selection were variable and their economic effects could be determined only by long and careful study. There was no general location so outstanding that it could at once be selected as best.

Field surveys and office studies to determine the best route for an aqueduct from the Colorado River to the coastal plain of southern California went forward from 1923 to 1931. An area of 25,000 square miles was surveyed and mapped, and more than 50 routes and variations of routes were given consideration.

In 1931 the district's engineering staff recommended the selection of the so-called Parker route for the aqueduct, and this selection was approved by the distinguished Engineering Board of Review. The Parker route takes its name from the fact that the aqueduct has its intake 2 miles upstream from where Parker Canyon Dam was built.

Estimates of the cost of constructing the aqueduct in its first development revealed that an investment of approximately $220 million would be required. In September of 1931 a bond issue of $220 million was submitted by the board to the 13 cities which then made up the Metropolitan Water District. It was the largest bond issue theretofore ever submitted to a popular vote. It was approved by the decisive ratio of nearly 5 to 1.

Actual construction work on the aqueduct was set under way in December 1932 after court litigation had cleared the way for the selling of the bonds and the financing of the aqueduct program. Construction work went forward three shifts a day, 7 days a week.

The aqueduct was completed in its initial development in June 1941. It turned out that the actual construction cost was about 80 percent of the original overall estimate. In other words, out of the bond issue of $220 million authorized by the voters in 1931 there had been invested in the initial aqueduct development up to June 1941 the amount of $180,316,000.

This total investment in the initial development of the aqueduct included the expenditure of $7,500,000 by the district to pay practically the entire cost of Parker Dam on the Colorado River. Parker Dam was needed to reregulate the flow of the Colorado River below Hoover Dam. (It is situated 150 miles downstream from Hoover Dam.)

I might say in this connection that we made a wonderful bargain with the State of Arizona. The Arizona navy with about 2 boats

came up the river with about 5 to 10 people without water or food. They landed on the Arizona shore and on the California shore the metropolitan crews served them food and water and kept them going. But it necessitated going to Congress with permission to build this. So we put up $7½ million and the Government put up $500,000 and between the two, the dam was built but we got half the power and the Government got the other half of the power. A very fine bargain for the Federal Government.

Parker Dam has formed a reservoir with the capacity of 717,000 acre-feet extending about 60 miles upstream. It has been named Lake Havasu. The intake of the Metropolitan Water District's aqueduct is situated on the California shoreline of Lake Havasu 2 miles upstream from Parker Dam. The dam serves to maintain the water level of Lake Havasu within limits agreed upon by contract entered into by the Department of the Interior and the Metropolitan Water District of Southern California. However, Parker Dam was constructed, is operated and is owned by the Federal Government. Its entire cost with the exception of $500,000, advanced as a grant by the PWA has been met with funds provided by the Metropolitan Water District of Southern California. The district has been granted the right for the development of one-half of the hydroelectric power at Parker Dam. The generating equipment and all other facilities required in connection with this power development by the district at Parker Dam have been provided by the Metropolitan Water District. The dam directly serves the interests of the Federal Government in the control of the interstate Colorado River system and is advantageous to the State of Arizona as a source of power and a means of water storage and regulation. Parker Dam is situated on that portion of the Colorado River which is a boundary line between the States of Arizona and California.

It will be recalled that the years 1931 and 1932 were in the period of a marked and extended financial depression in the United States. There was no private bond market for the sale of public or private securities of such an amount as was required in the financing of the aqueduct.

On September 13, 1932, the Reconstruction Finance Corporation agreed to bid on Colorado River aqueduct bonds. Altogether the Reconstruction Finance Corporation purchased metropolitan water district bonds in the total amount of $178,816,000. The Public Works Administration purchased $1,500,000 in district bonds. This made a total of $180,316,000 of Metropolitan Water District bonds sold to the RFC and the PWA.

In July 1938 the RFC began to offer the Metropolitan Water District bonds for public sale to banking and financial institutions throughout the country. All of the bonds were sold at par value and at a handsome premium. In fact, the premiums received by the Reconstruction Finance Corporation netted the Federal Government a profit of $13,646,127.80 as a result of this transaction with the Metropolitan Water District bonds. The bonds were sold at 4 percent or more interest and this enabled the Federal Government, Mr. Jesse Jones, to take a profit of $7 on the premium. They sold for $107 and they kept $7 and we paid the other.

That, gentlemen, constituted between a third and fourth of the money which Mr. Jones made for the Reconstruction Finance Corporation.

It has sometimes erroneously been indicated that the Federal Government subsidized the construction of the Metropolitan Water District aqueduct system. That, of course, is completely contrary to the facts. Instead of subsidizing the metropolitan aqueduct system the Federal Government actually derived a net profit of more than $13 million from its handling of aqueduct bonds. The cost of building and operating the Colorado River aqueduct is being borne entirely by the people served and benefited in the Metropolitan Water District.

The $220 million bond issue approved by the voters of the district in 1931 was planned to be used to finance the construction of the aqueduct in its first development.

The main aqueduct from the intake on the Colorado River to its terminal reservoir, Lake Mathews, in Riverside County, was built to its full ultimate capacity in most of its sections. All its tunnels, canals and covered conduits were built full capacity—a capacity sufficient to deliver 1,212,000 acre-feet annually to the district's service area. Other positions of the aqueduct, including inverted siphons and its pumping units were built to only part capacity.

Early in 1952 the district set underway a construction program to bring the aqueduct to its full planned capacity. This program of work is now nearing completion. Early in 1960 the main aqueduct will be able to deliver water to areas within the Metropolitan Water District at a rate of more than 1 billion gallons a day, or 1,212,000 acre-feet annually. The expansion program now underway calls for an investment of about $220 million, which happens to be the same figure as the original bond issue of $220 million. Part of that original bond issue money has gone into the aqueduct expansion program. Today the people of the district have an investment of approximately $375 million in the aqueduct. It has been conservatively estimated that had the aqueduct been constructed at present-day costs it would have required an investment of about $1 billion.

As previously stated, the Metropolitan Water District of Southern California extends into the five countries of Los Angeles, Orange, San Bernardino, San Diego, and Riverside. Our pumping plant units cost between three and four times what they cost in the thirties and that is an illustration of the expansion and inflation that has occurred in the cost.

The estimated safe yield of water from local sources in these five counties, plus the water imported by the Owens River aqueduct for Los Angeles is approximately 1,200,000 acre-feet annually.

I might say these are only estimates, others may give different figures but they are only estimates.

The Metropolitan Water District's contract with the U.S. Government calls for the delivery of 1,212,000 acre-feet of Colorado River water annually. This makes a total of 2,412,000 acre-feet annually.

Local water sources and the Owens River aqueduct are now yielding their full capacity. In fact there is an overdraught on underground supplies. Pending the importation of water from a new source, all population growth will depend upon Colorado River water.

In the fiscal year 1958–59 the Colorado River aqueduct delivered 601,000 acre-feet of water, or about one-half of its ultimate delivery capacity. This means that there are at the present time somewhere between a million and a half and two million people in southern California totally dependent upon the water supply of the Colorado River.

Actually, 350,000 acre-feet was sold as domestic water, 100,000 acre-feet sold for irrigation water, which of course replaces some irrigation water that has been used for population. So if you figure that there is approximately 400,000 acre-feet in use that would make 5 people per acre-foot, about a population of 4 million. When the aqueduct was completed in the city of San Diego in 1947, within 6 months there had been delivered to San Diego all the water that they had remaining in storage. The amount of water equal to what they had remaining in storage. In other words, San Diego would have dried up and blown away if it had not been for the aqueduct coming there. At the present time they are taking nearly a fourth of the water we deliver and the community has had a growth of nearly 100 percent.

The Colorado River aqueduct will be able to deliver somewhat more than 600,000 acre-feet of water annually in addition to the quantity now delivered. Taking into account domestic and industrial requirements it is estimated that in southern California an acre-foot of water will meet the requirements of five persons. This indicates that the Colorado River aqueduct has a delivery capacity sufficient to meet the needs of about 3 million more people. At the present rate of growth the population of southern California will be increased 3 million between 1970 and 1975.

These again are estimates and I will caution you that just as estimates made in the thirties were too pessimistic, and estimates in the fifties may be too optimistic, but based on present conditions it is certain that a new supply of 2 million to 3 million acre-feet of water must be regarded as a necessity to care for the growth of southern California within the 25- to 30-year period following 1970–75.

For a number of years the State of California, through the office of its State engineer, and more recently, through the Department of Water Resources, has carried forward an intensive statewide study of available water supplies and the present and future water needs of various sections of the State.

The State of California is confronted with a difficult water problem arising from the fact that the southern portion of the State, with more than half the State's total population has only about 2 percent of the water resources within the State.

Engineering studies and plans being made by the State Water Resources Department call for the building of a large number of dams with the conservation of water in northern California streams that is now wasting into the sea. These plans also call for the delivery of surplus water from areas of origin to areas of deficiency. First of the units of a statewide water plan to be presented by the water resources department is generally referred to as the Feather River project. I may explain, though, about one-fifth of the water will come from the Feather River and the other four-fifths is reported either to come

from the delta or elsewhere. It is assumed that your committee will be given detailed information concerning the studies and plans of the State Water Resources Department, and probably have in Sacramento yesterday, relative to plans for the delivery of water from the Sacramento River Delta into San Joaquin Valley and into southern California.

To meet the water needs of a growing population within its service area the Metropolitan Water District of Southern California looks to northern water supplies that will not be needed by the people living in the areas of origin.

The district seeks to work with the Water Resources Department and all affected areas north and south to the end that the best interests of all parts of the State be served.

At the 1959 session of the California State Legislature there was adopted a bill (S.B. 1106) that places a bond issue of $1,750,000,000 on the November 1960 ballot to finance construction of a water delivery project into the San Joaquin Valley and southern California. In this connection permit me to quote from a portion of a water policy statement adopted by the district's board of directors on October 2, 1959. That is only 14 days ago, 2 weeks ago.

Because southern California, under Senate bill 1106, must clearly depend eventually on water supplies from beyond the Sacramento Valley, the Metropolitan Water District of Southern California staff, aided by competent consultants, is studying the practicability of the projects that would be necessary to provide these supplies from north coast streams, and the construction time required to meet the State's obligations on contracts made under Senate bill 1106. Studies are also being made as to the effect of imported water on various areas in southern California.

Further, quoting from the district board's policy statement:

The Metropolitan Water District of Southern California advocates the replenishment of the underground water basins as essential to the ultimate conservation and use of the waters of the State. There are within the boundaries of the district seriously depleted ground water basins. The district is cooperating in the replenishment of these basins, and will continue to do so.

I might state that Orange County alone has purchased $5 million worth of water from the Metropolitan Water District for underground replenishment. On November 7 of this year the people of a portion of Los Angeles County will vote upon the formation of a replenishment water district at the city of Long Beach where back in 1905 water used to spout from artesian wells, probably 80 to 100 feet in the air in that same area. Now they are pumping water from a depth of 100 to 150 feet which means they are pumping water from below sea level. There has been salt water invasion into these wells so that many have been damaged. For example, the city of Santa Monica had to abandon its entire water system because of the invasion of sea water and had to move further inland. These are only temporary measures because the real solution is to restore into these underground basins the water that has been removed and to use them as great reservoirs in order to take care of the summer peak of demand. It is a remarkable thing that the metropolitan cities of San Francisco, Los Angeles, and San Diego are the only large cities, at least I know of in my travels in Europe and the United States and South America, that are dependent

solely upon water imported from long distances. All other areas are located on lakes or streams and have springs of variable quantity.

The Metropolitan Water District of Southern California has contracted for a study and report on saline water conversion by nuclear energy to indicate the practicability or impracticability of this source for use by the metropolitan water district.

Reference has been made to a water bond issue bill (senate bill 1106) adopted by the 1959 session of the legislature and signed by Gov. Edmund G. Brown. At the time this bill was before the legislature for consideration, the Metropolitan Water District of Southern California respectfully submitted a number of amendments deemed to be needed to assure the completion of a water delivery line into southern California and to assure a firm water supply to areas of deficiency. All of these amendments were rejected.

On October 2, the district's board of directors requested Governor Brown to call a special session of the legislature early in 1960 to consider amendments to senate bill 1106 that the district's board feels are required. We have not heard from the Governor. We hope that the Governor will give consideration to this. We call your attention to the fact there are two committees of the legislature, one in the senate under Senator Tell and the other in the assembly under Assemblyman Porter, both of whom are studying additional features which under senate bill 1106 the legislature may place or pass to regulate or establish the terms of contracts. At the present time there are no standards of contracts whatsoever. We have received some dicta from the staff of the district and there is a wide range of opinion of just what these mean.

The Director of Water Resources under the present bill, as an individual, politically appointed individual, subject to appointment by each Governor, is placed in charge of the $1,750 milliion by senate bill 1106. Without any description by the legislature of the bill. Senate bill 1106 was a financing bill and we therefore await with interest the future.

Now, then, there is attached to this statement a map showing the area of the district, the Colorado River and a profile showing the manner in which water is lifted and five pumping plants.

This whole system will be functioning at full capacity within less than a year's time, probably as early as next February or March and the request for additional water is such that we anticipate a continued increase in water usage from the Colorado River.

That concludes the statement.

(The map referred to faces this page.)

Senator KUCHEL. Thank you very much, Mr. Jensen.

Can you roughly indicate the amount of water which is used today in California? Do you have that figure?

Mr. JENSEN. We have the figure for southern California. It is given in this paper. But we have no State figure.

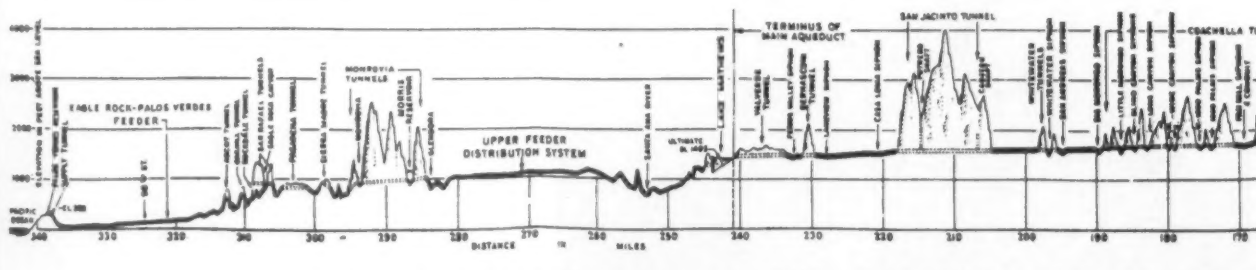
The CHAIRMAN. What percentage of the water consumption in southern California comes from ground water sources?

Mr. JENKINS. I would say about, roughly, 600,000 acre-feet or more.

Senator KUCHEL. What percentage would that be, then, Mr. Jensen?

Mr. JENSEN. About 50 percent or more.

Senator KUCHEL. About half?



THE METROPOLITAN WATER DISTRICT OF SOUTHE

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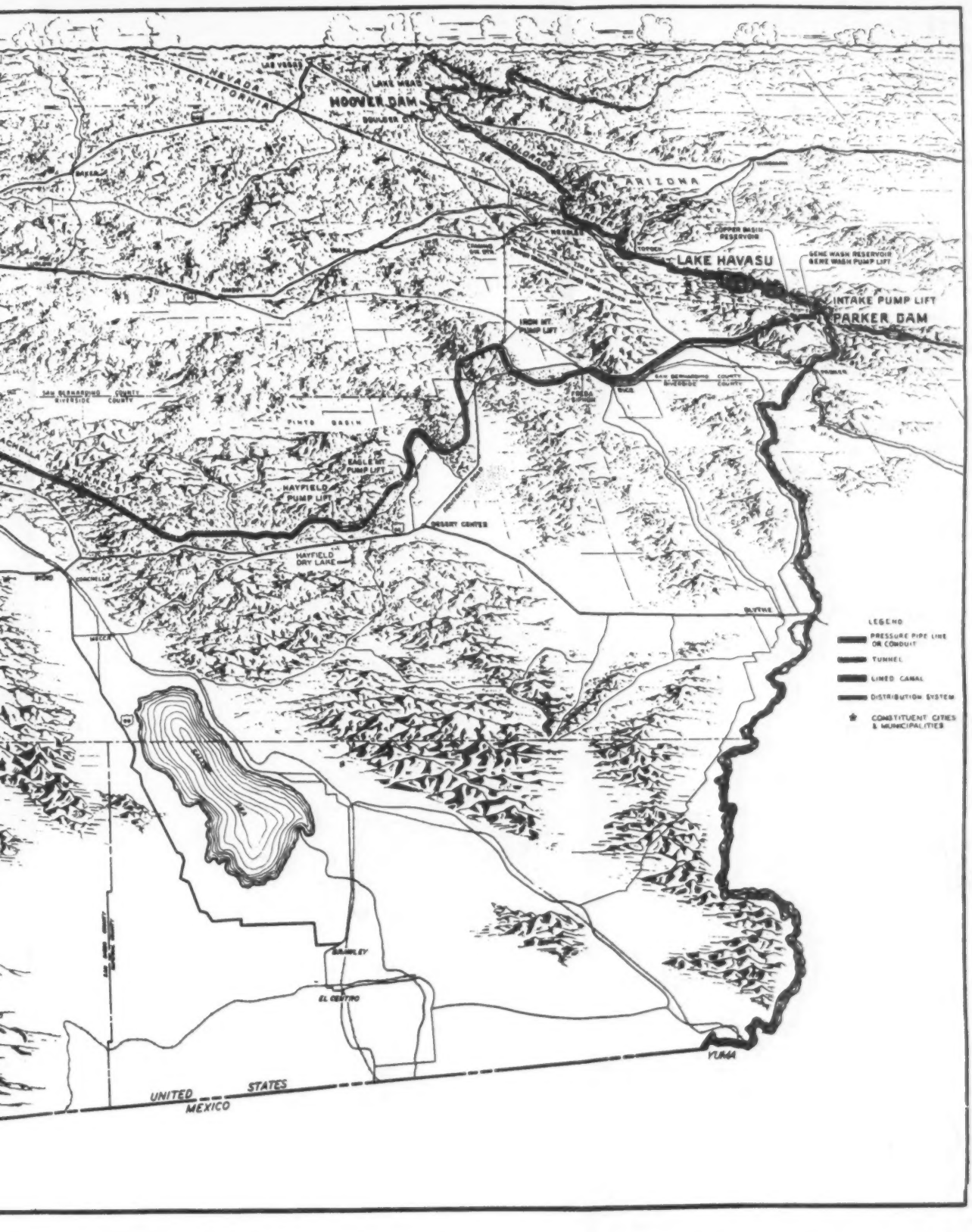
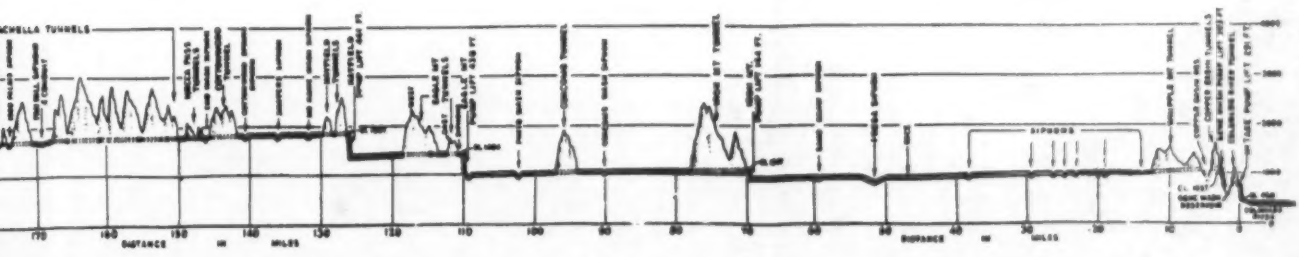




THERN CALIFORNIA – COLORADO RIVER AQUEDUCT

Revised Nov. 25, 1958 J-253-3

Mr. JENSEN. Wait a minute, now. I don't think you should use those figures. I had them in a booklet which I managed to lose in coming over here. I would have to furnish the figures. I have them estimated but I would not trust stating them from memory.

The CHAIRMAN. Senator Engle, any questions?

Senator ENGLE I observed from this statement, which begins on page 15 a quotation from the statement recently submitted on senate bill 1106, that the Metropolitan Water District feels that it has a complete financial capability of taking care of its own water problems. Or do I misunderstand that? Is that what that meant to say?

Mr. JENSEN. Yes, I think we can safely say that the Metropolitan Water District is within itself, within the five counties of southern California, capable of supplying itself with water independently of any State project. And when it takes water from the State project it will enter into a contract assuming all of the obligations to make a firm payment for all of the benefits that it acquires. The corollary to that is the Metropolitan Water District also expects all other beneficiaries of this project to enter into similar contracts assuming a similar burden. The statement of October 2 to which I referred provides or expresses the belief that no facilities should be built in the State project unless contracts guaranteeing its repayment have been accomplished. If this is not done we are going to have a different type of project. When Hoover Dam was built, Congress authorized the Secretary of the Interior only to begin construction when he had contracts sufficient to guarantee the repayment of the project. The Metropolitan Water District as the largest factor underwrote 36 percent of the power of Hoover Dam and assumed that obligation without facilities of any kind and the taxpayers have met that obligation. Hoover Dam will be paid for on time. If we can have a Hoover Dam type of program within the State for each area accepting water assuming the obligation then we are going to have one that is going to be sound and safe. If, however, there are subsidies to be passed out along the way, particularly to agriculture in the San Joaquin Valley, then that situation will not be wholesome, either, for the State or for anyone else, because the water should only be put to use where it can pay for its uses. Otherwise you force the construction of subsequent projects at higher cost to take care of this subsidized use of water. On those points we feel that this project has been presented to us upon the basis that every beneficiary will pay his own way and we look forward to that being done. Asking your question, again, Senator, if the Metropolitan Water District were free and the State project were not before it, it would be able to bring its own supplies of water from northern California. If the title to that water can be guaranteed in a satisfactory manner.

We have two laws here, a county of origin and a watershed protection act that cast a cloud upon the title of all the water that is coming to northern California unless we can find areas where agreements can be made that would eliminate that claim upon us.

Senator ENGLE. Did you ever make filings up on the Eel River or any of those?

Mr. JENSEN. The Metropolitan Water District has made no filings on the Eel River. The State of California made filings on the Eel River in 1956, as recent as that. It has done some work investigating

development on the Eel River. We have hired consultants to do the same, because it appears that eventually the water that southern California will get will have to come from the coast and not from the Sacramento Valley.

The California Watershed Protection Act in section 11460 under the heading "Priority to Watershed Water" reads as follows:

> In the construction and operation by the department of any project under the provisions of this part a watershed or area wherein water originates or an area immediately adjacent thereto which can be conveniently supplied with water therefrom shall not be deprived by the Department directly or indirectly of the prior right to all of the water reasonably required to adequately supply the beneficial needs of the watershed area of any of the inhabitants or property owners therein.

That is such a cloud upon the title from northern California water that we seek some relief in this.

There are some who think they can make a contract with the State but thus far we have had no formal contract. We have had no assurance of the quality of water we can receive and the other part of it is we find a division of attitude of the organization. One representative of the Department represents that being correct is more accurate than timing, and any one who attempts to negotiate a contract may discover that he negotiates up to the election and has lost his position because after the election the atmosphere will be entirely different.

A good lawyer can make a perfect contract. He can put a favored-nations clause in his contract. As to whether the contract will be accepted or not accepted is entirely dependent upon the atmosphere of the person granting the contract and the conditions surrounding at that time. If Senate bill 1106 is passed and $1,750 million are available to the director of water resources, then he will state what goes in the contract and not the purchaser.

In my judgment it is highly desirable that before this bond issue is voted, it began by contracts as was Hoover Dam, that it will be a financial success and will be paid for by the beneficiaries.

Senator ENGLE. Thank you very much.

The CHAIRMAN. Senator Young, any questions?

Senator YOUNG. Yes. I have one question.

If the voters disapprove of this State-sponsored project, where would southern California get its water?

Mr. JENSEN. Our studies already indicate that there is sufficient water on the Eel, Madison, and Van Deusen Rivers, that could be filed for. But, of course, we , on February 10 of this year, adopted a statement, the only statement adopted by any public agency of a State water plan and presented it to the members of the legislature, and we pledged ourselves in that statement impliedly to support the State water plan.

Now, there are many things in this State water plan, statewide water plan that we propose that are not in Senate bill 1106. We have summarized them in the statement of October 2. We have asked the Governor to call the session of the legislature. But you must remember, Senator, that 1960 is not the only year in life. It is only one year in life. If we fail in 1960, we can try again.

Senator YOUNG. I didn't quite get you. Where would you get the water supply if this project were disapproved? Are those rivers in southern California?

Mr. JENSEN. Those rivers are in northern California on the coast range but they all run through mountainous, wooded territory where there is no great agricultural use.

Senator YOUNG. How would you get the water down here?

Mr. JENSEN. We would have to build our own aqueduct as we did from the Colorado River. It would be probably twice to three times as expensive. But the assessed valuation of the district is now $12,700,000. By the time this project is finished we should have an assessed valuation of $20 million or more. We could carry a project of that kind ourselves. But we are not proposing it. The matter was discussed last summer, but our board took no action on the subject and preferred, instead, to support the State water plan and on February 10 made a statement to that effect.

Senator YOUNG. Thank you.

The CHAIRMAN. Mr. Jensen, yesterday in Sacramento a number of the members of the legislature, I think in the main if not entirely from rural areas, all agreed that they hoped the Federal Government would continue with reclamation projects in the State regardless of the development of the State water plan on the Feather River project. All of them stressed the fact that agriculture in California would receive so-called cheap water by reason of the pure subsidies, and so forth.

Let me ask you, because this is a national committee, a committee of responsibility to make recommendations on a national basis, as a general rule would you favor participation of the Federal Government in the solution of the water problem of the given State along the guidelines laid down by the State government?

Mr. JENSEN. Most assuredly. With the policy of the Federal Government to spend money for irrigation and development of water there is no one of the Western States—and I have been in practically all of them and have studied their economy—there is none that affords a better opportunity to return to the Federal Government a full measure of the money that it spends; whereas in my native State of Utah the upper Colorado River project will do some good, I doubt very much if the Federal Government will ever get its money back. That applies to some projects in Wyoming, where you can cross through them and the facilities are there and there is an occasional ranchhouse, but the elevation is too high. But here in California every dollar that is spent will be returned to the Federal Government.

Now, the fortunate thing about Federal expenditures is that the money is interest free. When you pay interest on a sum of money over a 30- to 40-year period, the interest just doubles the cost. So if the Federal Government project is able to develop water at $5, a State project with interest-bearing money should cost $10 per acre-foot. In other words, the cost should be about doubled. I think it would be a grave misfortune to the people of California not to have the benefit of the assistance of the Federal Government.

Now, so far as Metropolitan is concerned, that is not our problem. We have not asked the Federal Government for help. If the Federal Government, however, chooses to embark upon this policy of assisting cities and communities and populated areas out of which the taxes come, then, of course, we are not willing to be so "chinche," or, at least, I hope the people here will not be so "chinche," that they will not be willing to participate in receiving as well as paying through taxes.

The CHAIRMAN. Would it be fair, however, to say that the Federal participation in the solution of our southern California water problems occurred when the Hoover Dam was constructed by the Federal Government to provide a means for——

Mr. JENSEN. Most assuredly, because without the advance of the money by the Federal Government the community here would not have been able to do it and the Federal Government did a wonderful thing in facilitating building of Hoover Dam. In contrast to that, there is the proposal now being made in a bill introduced by Congressmen Lipscomb that the public agencies of Arizona, Nevada, and California shall advance the money to the Federal Government for building the Bridge Canyon Dam. At this time I think these communities would be able to advance the money and also repay it so that the Government would be one step better off even than Hoover Dam. Yes, we must consider the help of the Federal Government in southern California on Hoover Dam as a magnificent thing that made the prosperity of this community and likewise the help of the Federal Government in the Imperial Valley in that development. So that southern California has benefited by the help of the Federal Government. But I am sure that the Imperial Irrigation District is going to be the outstanding star in the activities of the Reclamation Bureau in repaying promptly and in full all of the money advanced. Thus far there had been very few reclamation projects that have paid out.

The CHAIRMAN. Now, sir, is it true that some of the water that flows through the system of the Metropolitan Water District serves the needs of agriculture in southern California?

Mr. JENSEN. At the present time, approximately 100,000 acre-feet of water are being used for agriculture and roughly I would estimate that at least half of this replaces underground water and local sources that have been taken from agriculture and used for people. We have found from experience that the amount of water needed for irrigation is about the amount of water needed for the people that live on the same acre of land. Of course the water is taken in a different way but the quantity is approximately the same.

The CHAIRMAN. When you use that figure 100,000 acre-feet, Mr. Jensen, over what period of time and over what area?

Mr. JENSEN. That is within the entire area of the Metropolitan Water District. In two places there has been an increase in the use of water for agriculture, namely, in Riverside County, especially in the vicinity of Ennis, Ferrum, and San Jacinto, and again in San Diego County. But, on the other hand, the enormous growth in Los Angeles and Orange County has taken large quantities of agriculture water that is now being used for domestic purposes. So that a part of that 100,000 acre-feet of water that we supply for agriculture really replaces former agricultural water.

The CHAIRMAN. Over what period of time, when you say 100,000 acre-feet?

Mr. JENSEN. That was in the year 1958–59. In the period that ended on July 1 of this year.

The CHAIRMAN. A 12-month period?

Mr. JENSEN. In a 12-month period.

The CHAIRMAN. Roughly what percentage does that 100,000 acre-feet represent of the amount of water which you accept from the Colorado River and distribute?

Mr. JENSEN. At the present time it represents one-sixth.

The CHAIRMAN. Now, sir, is there any different cost to the southern California farmer who uses any part of that 100,000 acre-feet from what municipalities pay you for the water to be used in their own systems to serve the people?

Mr. JENSEN. Yes. At the present time we sell untreated water for domestic purposes at $15 an acre-foot and we sell the same kind of water for agriculture at $12 an acre-foot and we also sell it for spreading, that is, for underground storage, at $12 an acre-foot. You should not figure that those are the total costs of the water because the taxpayer at the present time is paying an additional $20 an acre-foot toward that water. When all of our water is in use that $20 per acre-foot will be cut to $10 per acre-foot so that our water would be about $25 per acre foot with the aqueduct running at full capacity.

The CHAIRMAN. In the enabling legislation by which the Metropolitan Water District is created, is any priority of use set forth?

Mr. JENSEN. Yes. The priority is in favor of the domestic and municipal usage. Agriculture must accept the rating that it is getting surplus water. That is one of the reasons why the surplus water is sold at a different price. We made a study in 1958 through one of our committees and it appeared that somewhere along that line was the limit beyond which the people could not pay and operate successfully.

The CHAIRMAN. Is there any similar priority-of-use statute in the laws of California to govern any waters flowing through any State system?

Mr. JENSEN. I understand there are acts of the legislature but I cannot quote them.

The CHAIRMAN. Would it be fair to say that as the population in southern California increases the hazard of your being able to assist southern California in agriculture would grow because of the statutory priority of human beings first?

Mr. JENSEN. That is a certainty. And within the next 30 to 50 years there will be a definite decrease in the amount of water used for agriculture. The water in northern California is going to be so high-priced that we cannot use it for agriculture.

The CHAIRMAN. In southern California?

Mr. JENSEN. In southern California.

The CHAIRMAN. Would that be true in northern California, too, in your opinion?

Mr. JENSEN. From the statements made by the irrigation districts association I would assume that they anticipate that they are going to pay their way. Unfortunately, in the hearings conducted by the Teale committee, I was rather shocked to have one senator from the valley indicate that they could not pay their way and some witnesses have appeared before these various committees are beginning to talk about agriculture being able to pay so much and no more and talking about a subsidy. It is not fair to sell us a project upon the theory that it will pay for itself and then end up by having subsidies granted to agriculture, because agriculture uses about three-fourths of the water, 75 to 80 percent of the water, and if a major portion of that water is subsidized and southern California pays half of the taxes, it not only has the burden of bringing its water the greatest distance and paying the greatest cost, it would then have thrown upon it the burden of

subsidizing agriculture in addition. That is a load which it is not fair to expect us to carry.

Senator YOUNG. May I ask this question? If you did not have water for these farmers here and you did not have a sizable agricultural production, the consumers would have to bring food from longer distances and they would be paying a higher bill, wouldn't they?

Mr. JENSEN. That question is cited by some people, and I would say that it is not without merit. But the balance would be reached, the balance would be reached when the man that uses the water pays for his water and is paid for what he produces and it will not be reached by subsidizing.

Senator YOUNG. In effect you subsidize electrical power for industrial use.

Mr. JENSEN. We don't here in southern California.

Senator YOUNG. The industrial users get power for about a third the price that average consumers get it, do they not?

Mr. JENSEN. That is based upon the rates of the power companies, depending upon the quantity used. If the private homeowner were able to use the same quantity of power as industry uses, he would get it at the same price. But the first cost of delivering either water or power is the cost of servicing delivery and not of the material produced. The utility rates of our private utility companies are set by the utilities commission to permit them to earn somewhere between—theoretically they are supposed to be allowed 6 percent but it works out they get about 4 or 4½ percent. But those things are well regulated. And our utilities commission does this.

Furthermore, two-thirds to three-fourth of our power is now steam power, where the cost can be determined currently and absolutely with accuracy for any period of time.

Senator YOUNG. What fuel is used for steam power?

Mr. JENSEN. In California they use fuel oil and natural gas. Here in Los Angeles, because of the smog conditions the county is forcing the use of natural gas, which is imported from Texas. As an oilman I think that that is an improper imposition upon us because I don't think that oil is nearly as much to blame as the automobile. The automobile is the thing that makes the smog and that means that 2½ million automobiles of this district are to blame and not the industries.

Senator YOUNG. You could not do away with them, either.

The CHAIRMAN. Thank you very much, sir.

The CHAIRMAN. The next witness will be Mr. William E. Warne, director of the State Department of Fish and Game.

STATEMENT OF WILLIAM E. WARNE, DIRECTOR, STATE DEPARTMENT OF FISH AND GAME

Mr. WARNE. Mr. Chairman, members of the committee, my name is William E. Warne. I am the director of the California Department of Fish and Game. I have appeared before various members of this committee in various other capacities at earlier times.

Senator ENGLE. Would you state for the record what those capacities were?

Mr. WARNE. Well, Senator, when you were chairman of the House Interior Committee and I was in the Interior Department, I appeared

both as Assistant Commissioner of the Bureau of Reclamation, as an Assistant Secretary of the Department of Interior for Water and Power, and in various committees before Senator Young as a proponent of the Missouri River basin development and others. I even had the honor of appearing with Senator Engle at the dedication of Shasta Dam. So, for 25 years, 16 of it in the Department of Interior, I have worked with these resource development programs.

If it pleases the committee, I would like to follow the lead that Mr. Jensen gave us a minute ago and file the appendix in the record.

The CHAIRMAN. Thank you, Mr. Warne. The exhibits and the appendix will follow your statement.

Mr. WARNE. Through the ages, man has struggled to control water for drinking, irrigation, industry, and to protect land and property from floods.

Necessity and profit were principal considerations of the engineers who built those tremendous monuments to man's ingenuity such as Hoover, Shasta, and Bonneville Dams here in the West. Similarly, the basic necessities of man led the Romans to build their aqueducts, the ancient Persians to build dams and waterworks on streams in Asian deserts 2,500 years ago, the Egyptians their irrigation system on the Nile, and the Babylonian queen to "fill the valley with ditches."

Great civilizations of the world have risen and sustained themselves, or fallen, with their water supply and the use thereof. Each has developed and controlled water solely as a matter of life or death or for the measurable dollars-in-the-bank benefit of water itself.

In a relatively uncrowded Nation such as ours with ample water and other natural resources a single interest approach is not necessary as it might be in a crowded nation such as China. In this great country, we now have the opportunity to develop our water resources in the future in a new way.

STEP FORWARD PROPOSED

A look toward the future in considering our water development problems of today, having in mind our economic strength and level of living, strongly suggests that America is ready and can afford a refined step forward in the development of its water and other renewable natural resources, guided by new creative philosophies which recognize changing human values.

Values cannot always be measured in dollars, although dollars must always be considered and provided for all resource development. Given a reasonable plan which contributes to the general welfare of the Nation, the Congress has always developed ways and means to provide those things which improve the well-being of our people.

EXPERIENCE POINTS THE WAY

I was an official of the Bureau of Reclamation when Friant Dam was built. It wiped out a valuable salmon run, and other fisheries, and the recreational potential of the San Joaquin River because no one officially mentioned the need for preserving them. I also helped plan and dedicate Shasta Dam, which not only protected, but enhanced, the fisheries and recreational assets of the Sacramento River as a secondary benefit, and I am proud of that. Today, as the one who is charged with the perpetuation of recreation, I would propose to you

that we look to future human values in considering all and any of the Nation's water problems.

Let's think toward the day when these United States have as many people per acre as did those civilizations which became great, then died or were buried, in part because they had planned their resources development only for tomorrow. Let's envision a civilization wherein not only can a man satisfy his basic appetites by his own initiative and imagination, but also can have the opportunity of fulfilling his innermost esthetic needs for communing with nature, relaxing in the out-of-doors away from his fellow man to rebuild those hidden strengths which have made pioneer Americans great. In terms of other civilizations, we all are still pioneer Americans with our future before us. We need not let the American clock run down physically or spiritually.

A bill of rights is needed for development of our remaining renewable natural resources. Some considerations are these:

NEW CONCEPTS PROPOSED

First, no renewable resource should be destroyed in development of or in controlling another.

Second, each manipulation of a renewable resource should be made to serve the maximum number of human desires and needs.

Third, esthetic values should be recognized in terms other than those of economic value. New concepts, based on study, are needed in this area.

Fourth, fish and wildlife, including recreation, is a beneficial use of water, and should be so recognized nationally.

Fifth, the prevention of damage to fish and wildlife resources resulting from other uses of water should be compensated or mitigated by those directly benefiting.

Sixth, enhancement of one resource, or improvement of our use of a resource, while developing or controlling another, should be made a part of the basic plan for the primary purpose of the development.

Seventh, fish and wildlife belong to all the people; thus their protection and propagation and the enhancement of their environment is a responsibility of all the people.

In providing you with facts and information to support this thesis, I propose to discuss briefly what we consider to be basic aspects of the Nation's water problems, as they more particularly relate to California and the western United States, supplementing my remarks with substantiating materials for the record. This material will generally follow the outline of information desired by your committee as issued on September 3 of this year.

THE WEST HAS POPULATION "EXPLOSION"

Since 1945, California each year has received and made a place for half a million new residents. The other Western States have experienced similar population "explosions." There are no signs that this westward movement is slowing down.

There are many complicated reasons why the West is booming. One of the simpler, and perhaps most compelling reasons, is the obvious desire of the human being to live in a comfortable climate with relaxing opportunities dependent upon rich natural resources and an

attractive, comfortable out-of-doors. Hunting and fishing on a year-around basis are a basic part of this way of life which is the heritage of the West.

Fish and wildlife provide a significant contribution to outdoor recreation in the West, and materially to the economic welfare of its people.

As the agency of State government delegated the responsibility to protect, maintain and enhance the public resources of fish and wildlife, the California Department of Fish and Game is deeply concerned over the skyrocketing demands upon these resources by a rapidly increasing population. We look to proposed water development projects for beneficial effects.

CALIFORNIA WILDLIFE RESOURCES

California is blessed with the richest treasure of wildlife of any State in the Nation. Some of it represents native populations while much was brought here and propagated by the white man.

Virtually every species of fish and wildlife of importance to Californians today is affected materially by human activities. Deer in particular "bloom" as men develop hill and mountain resources.

As a result, California has the largest deer population of any State—more than 1 million animals, estimated to be greater than in the days of 1849.

Doves usually provide the biggest bag in numbers of any with 20 million to 30 million birds estimated annually to live in or migrate through California.

Waterfowl has been rehabilitated in California during the past 15 years with an estimated 6 million to 10 million birds wintering in the State annually. About 170,000 hunters pursue waterfowl.

The CHAIRMAN. Let me ask you right there if I may, on another subject, have you a position on what the Federal rules are with respect to duck hunting in California this year?

Mr. WARNE. Yes, sir.

The CHAIRMAN. What is your position?

Mr. WARNE. Our position is that we think the Federal Government was too conservative.

The CHAIRMAN. I congratulate you.

Mr. WARNE. We protested the five limit and hoped actually that we could get a greater limit. The census that we have made up to now indicates that about 10 percent more ducks are in California so far than in the past year or perhaps I should say in former years.

The CHAIRMAN. I apologize.

Senator ENGLE. May I ask a question right there. I am intensely interested in this matter. How does the Federal Fish and Wildlife set those limits? I got after them one time about something they were doing. They informed me that I should come back home and quarrel with my own people. They said they had acted upon the recommendation and followed the recommendation of the State fish and game people. Do they do that as a matter of practice, or not?

Mr. WARNE. Senator Engle, there is a Western Flyway Council, of which I happen to be, I guess, chairman this year, though not at the time this resolution was made. The Western Flyway Council is consulted and makes recommendations but the council's recommendations

are in no sense binding on the Fish and Wildlife Service which has its means of determining estimates of hatches in the far north and bases its determinations on what it considers the controlling facts. This year our council's recommendations were not followed.

Senator ENGLE. I am glad to learn that, that is, to learn that our people did not recommend that five-duck limit. We will try to do something about it next time.

Mr. WARNE. We hope we have better luck next year.

A healthy pheasant population exists principally in the rice areas of the State. More than 200,000 hunters go after the birds each year.

A wide variety of other big and upland game includes quail, bears, wild boars, sage hens, chukar partridges, bandtailed pigeons, and rabbits.

Senator ENGLE. Will you permit me to interrupt? I observe that you stated there that the deer population was greater now than it was in 1849.

Mr. WARNE. Of course we did not make the census of the deer population in 1849.

Senator ENGLE. That is what I was going to ask you. I just wanted to say that I hunted with great diligence for a whole day and I didn't even see a horn.

Mr. WARNE. I happened to be present, Senator, in several counties of your old district when you were a Congressman and I saw parties of six and seven take out a buck apiece on opening day of this season.

Senator ENGLE. I guess they got them before I got out there because there were not any left.

Mr. WARNE. Maybe they had a little better luck. This year has been a good year in all respects with regard to deer.

CALIFORNIA FISHERIES RESOURCES

Fishing attracts about 1,350,000 license buyers and an uncounted number of youngsters under 16 years of age who don't need licenses in the State of California.

California has about 1,100 miles of coastline, 82 major reservoirs with 375,000 surface acres, 26,000 miles of fishable streams and between 7,000 and 8,000 lakes which sustain a variety of fish species for year-round fishing. By 1978 an additional 63 reservoirs, incorporated in the California water plan, are expected to provide an additional 180,000 surface acres of fishing waters.

Most popular fish are trout for which about half of all anglers go each year. In addition to the vast natural production of streams which provide a majority of the fish caught, the department also plants about 7 million catchable trout and 14 million fingerlings raised in its hatcheries.

Warm water fish, including catfish, sunfish, black bass, crappie; anadromous fish such as salmon, steelhead, striped bass, shad, and sturgeon and a wide variety of ocean species such as yellowtail, bonito, rockfish, flat fish, and surf fish attract their share of fishermen. California sportsmen spend in excess of half a billion dollars annually in pursuit of these resources.

Often overlooked as fish and wildlife resources of the State are those upon which a half-billion-dollar commercial industry depends. These include salmon from the Sacramento and other rivers, tunas from the

Pacific, abalone, oysters in Humbolt Bay, harvested kelp, fresh market fish, and a major shrimp industry developed recently by the department.

Also often overlooked because they have no measurable economic value are the hundreds of species of birds and mammals which are not listed as game but which nevertheless have great esthetic value. The songbirds, the fur bearers, the waterbirds all have a place in the future of America, but like the fish and game specifically sought by sportsmen, these birds and animals also must be planned for in the multiple use of our land and water.

NEW NATIONAL POLICY NEEDED

All too often in the past, fish and wildlife have been the stepchild to be kicked aside in water development planning. Water developers were often unwilling to concede some of the frosting on their project cake in the interest of maintaining fish, wildlife, and recreation values. The desire to milk the last kilowatt of power or the last drop of water for irrigation out of a project for one use without consideration of other uses, has been a tendency. It has been offset recently and could well be reversed by adoption of strong national policy in water development.

It is encouraging to note that in recent years there is a trend toward official recognition of the land and water needs for fish, wildlife, and recreation. The California Legislature, as well as the Congress, has adopted or is giving serious consideration to legislation pointing the way toward enlightened water development incorporating protection and enhancement of these resources. I have quoted from several recent California enactments and referred to various Federal enactments such as the Coordination Act.

These enactments are giving long-needed legal recognition to the fact that fish and wildlife are completely dependent upon land and water for their existence and that these resources themselves are legal users of water whose rights must be protected under the law of the land. Even stronger and more far-reaching enactments of this nature are needed in the national interest.

DEVELOP WATER AND BENEFIT FISH AND WILDLIFE

The concept that water should be developed specifically for the welfare and benefit of fish and wildlife resources is a relatively new one. It is one which California has undertaken to make an integral part of the great California water plan, and the first project—construction of a lake in Plumas County—is actually underway. Here again we believe it would be in the national interest for the Congress to develop and adopt policy supporting this concept of water development.

The fish and wildlife resources of California, the West, and the Nation will play a vital role in the future well-being of all our people, provided these resources are managed properly and if their vital land and water needs are supplied through adequate development planning, and land acquisition or reservation.

Unfortunately, the development of water for the enhancement of fish and wildlife and for recreation has generally been considered

acceptable only if it does not materially detract from the primary purposes of the project. The development of water for fish and wildlife enhancement as a primary-object purpose is only beginning to be accepted.

TOTAL DIVERSION DISASTROUS

In the broad picture there must not only be recognition of, but planning for, and actual reservation of the water needs of fish and wildlife. We cannot continue to divert all of our water supplies for irrigation, industrial or hydroelectric power if we want to have suitable fish and wildlife resources for future generations.

If we really want to provide for the needs of the fish and wildlife populations we must recognize, and the water-development planning must show, that in many if not all basins certain quantities of water are reserved or earmarked for fish and wildlife and recreation purposes.

This also involves the recognition that for maintenance of our important salmon, steelhead, and other species which migrate between the ocean and fresh water, a flow of water into the ocean is a beneficial and valuable use of water—not a waste of water as is sometimes claimed.

With the foregoing thoughts and information for a background let me now turn to comments directed specifically at the problems being reviewed and the information desired by the committee.

NATIONAL INTEREST IN WATER DEVELOPMENT

First, what is the extent to which water-resources activities in the United States are related to the national interest?

It is difficult to draw a distinct line between what is of national interest or what is strictly of State or even local interest. Where do we draw the line, if we must? I have some suggestions which are based primarily on the fish and wildlife aspects of the problem.

The water needs of fish and wildlife resources which are harvested or conserved by the people of more than one State should most certainly be considered of national interest. Thus, for example, the water needs of the Sacramento River salmon stocks should be of national interest because they not only support important California sport and commercial fisheries but also make major contributions to the fisheries of Oregon and Washington and some contributions to Canada as well. I have a little map in the appendix which will give you some picture of that.

The water needs of fish and wildlife and related matters should always be considered of national interest when interstate streams are involved or when projects are proposed on land already under Federal ownership, especially national forest or national park land. Waters of this character include the Smith, Klamath, and Colorado Rivers and Lake Tahoe.

The fish and wildlife and recreation aspects of large federally financed reclamation and flood control projects should be considered of national interest. It should be possible to acquire land, build or enlarge reservoirs, or do other work for the specific purpose of improving fish and wildlife and recreation in connection with such developments.

EXAMPLE OF PROBLEM

California is going through a most discouraging experience resulting from construction of Federal water-development projects which do not include reservations of land around bodies of water for fishing, hunting, and other recreation uses.

Having created tremendous potential recreational opportunities by impoundment of waters, such as behind Folsom Dam, the Government acquired very little land for recreational development. The State then, seeking to meet recreational needs around the lake in the general public interest, was forced to purchase the lands for public use at prices many times in excess of those by which the Federal Government had originally acquired property in the area.

MANY SIMILAR CASES

There are innumerable similar examples of lack of recognition in Federal policy and projects that benefits are not necessarily single in nature, and that development of all potential assets should be planned and carried forward as an integral part of the project. Lack of such planning in Federal projects has created major problems involving fish, wildlife, and recreation at Isabella Reservoir in Kern County, Salinas Reservoir in San Luis Obispo County, Coyote Dam and Reservoir in Mendocino County and Black Butte Dam and Reservoir in Glenn County—just to name a few.

We feel the Federal Government has an obligation to include fishing access and recreational development in the completion of these projects, and that in future projects these developments should be as much an integral part of the reservoir plan as are such items as powerhouses, diversion structures, and regulating forebays.

Although there may be other deserving criteria to establish national interest in water-development projects, we suggest only one more; namely, that Federal-aid programs which contain specific provisions for fish and wildlife or recreation grants should automatically be within the area of national interest.

CHARACTER AND REQUIREMENTS OF WATER DEVELOPMENT

Your next major question concerns the extent and character of water-resources activities that can be expected to be required to provide the quantity and quality of water for use between the present time and 1980.

The eight additional specific questions which you have posed, seem conveniently to fall under this general heading and since for my purpose there is small difference between the years of 1980 and 2000 I shall proceed to cover these more specific questions here as well. My comments are based primarily on fish and wildlife aspects of the problem.

You ask: How much water development is needed?

No specific studies have been made which would lend good answers to this question from the standpoint of development for fish and wildlife and recreation. There is no question in my mind that extensive development of water for fish and wildlife and recreation is not only needed but will in time take place. Studies at both the Fed-

eral and State level should be initiated to give much needed answers to this and several of the other questions asked by the committee.

The California Public Outdoor Recreation Committee is currently reviewing recreational resources and needs, and coupled with national reviews of recreation resources underway may give some answers to this question.

When is it needed?

Scientific developments of water for the enhancement of the salmon runs of the Sacramento River and its tributaries is needed now not only to aid this declining resource of great national interest but also to offset the loss of the salmon and other fisheries resources by development of the San Joaquin River to the exclusion of fish. In reality specific water development for fish and wildlife is overdue.

Where is it needed?

I have a map in appendix C which will give the indications of where the problem rests with regard to the salmon.

Throughout the State of California, but particularly on the anadromous fish streams and specially on the tributaries of the Sacramento River below Keswick Dam. See appendix C for Sacramento River salmon problems.

What should be the pattern of water development?

(1) Multiple purpose—not single purpose. True multiple purpose should include the concept that fish and game and recreation are among the primary purposes of the project—not just incidental to others.

(2) Emphasis should be placed on developing water for fish and wildlife enhancement in areas or in a manner so as to offset the losses to these resources incurred by other Federal water development projects such as the Friant Dam operations on the San Joaquin River.

(3) Recognition in the development of the following:

(*a*) Fish and wildlife are beneficial and legitimate users of water just as are agriculture and industry.

(*b*) The development of water for fish and wildlife and recreation uses is in the national interest, particularly in those cases discussed previously under national interest.

(4) More specifically water development should follow a pattern which includes the following as integral objectives:

(*a*) Streamflow maintenance below dams where fisheries resources can be maintained or enhanced.

(*b*) Enlarged minimum pools in reservoirs for maintenance or enhancement of fish and wildlife populations and greater recreation values.

(*c*) Land planning and acquisition of land specifically for fish and wildlife and recreation development and access around large reservoirs. Access to these places is an especially important problem.

(*d*) Provision for continued dilution of existing waste loads after development or concurrent reduction of waste loads with decreased waterflows.

What levels of cost and expenditure are justifiable for future water development?

There is a great controversy and many, many methods used in attempting to place a monetary value on fish and wildlife recreation. There is a wide margin between the philosophies of single-purpose

water developers with their eyes exclusively on profit, engineering efficiency, or debt retirement on the one hand, and the fish and wildlife manager and recreation specialist on the other. It is extremely difficult to place a cold dollar value on a resource such as fish and wildlife which today is largely valued because of its great recreational use. Recreation has all too many intangible and esthetic values to be placed neatly in an economic pigeonhole with a dollar-sign nameplate.

We must provide for development of water for fish and wildlife and recreation despite our present inability to place a specific dollar sign on them which would be universally accepted. To set such development aside because of the lack of a method of evaluation acceptable to all interests would be doing a great disservice to the public welfare. We must act to supply the water and land needs of fish and wildlife and recreation even if it means relying on judgment rather than a precise mathematical formula.

What amounts of water will be required in relation to various levels of population and economic activity, stated by time periods and geographic areas?

Here again we are not in a position to give a specific answer. Studies should be made. Proportionately, we can say the requirements for fish and wildlife will never be large.

What are the economic limits for water development in terms of cost per acre-foot?

As mentioned previously we do not have at the present time and may never have a universally accepted value upon which to base this limit in relation to water development for fish and wildlife. Further studies should be made but even then, and most certainly until then, we shall have to use judgment and proceed judiciously.

How much expenditure of public and private funds can be economically justified for water programs?

We have no suggestions on this point as it relates to the fish and wildlife and recreational values.

Other information believed to be helpful in considering water resources policies for the future:

Here I would call your atention to two areas of major concern in California. There is a great need for improved water-pollution control—a strong policy and action program on both Federal and State levels is needed to protect water supplies developed and transported. California is moving ahead rapidly on this problem. Additional Federal action would help.

Gravel extraction from streambeds is another problem of growing import in California. Large programs of dam and highway construction call for huge quantities of gravel. Gravel extraction from salmon-spawning beds or the siltation caused by such operations has become a matter of serious proportions for us. Not only are the beds disturbed by the taking of the gravel but the siltation in effect solidifies the beds downstream. Special recognition of this problem and corrective measures should be made a part of both Federal and State water-development and highway programs.

SUMMARY AND CONCLUSION

In conclusion, I would like to reemphasize the basic points made in this presentation. These points—seven in number—are as follows:

First, no renewable resource should be destroyed in development of or in control of another.

Second, each manipulation of a renewable resource should be made to serve the maximum number of human desires and needs.

Third, esthetic values must be recognized in terms other than those of economic values. We must act to supply the water and land needs of fish and wildlife and recreation even if it means relying on judgment rather than a precise mathematical formula.

Fourth, fish and wildlife, including recreation, is a beneficial use of water, and should be so recognized nationally.

Fifth, the prevention of damage to fish and wildlife resources resulting from other uses of water should be compensated or mitigated by those directly benefiting. The desire to milk the last kilowatt of power or the last drop of water for irrigation out of a project for one use without consideration of other uses should be a thing of the past.

Sixth, enhancement of one resource, or improvement of our use of a resource, while developing or controlling another, should be made a part of the basic plan for the primary purpose of the development. The fish and wildlife resources of California, the rest of the West and the Nation, will play a vital role in the future well-being of all our people. Water development for enhancement of fish and wildlife and for recreation should be a basic and integral part of the Nation's program of water development—definitely not a secondary or incidental element.

Seventh, fish and wildlife belong to all the people; thus, their protection and propagation and the enhancement of their environment is a responsibility shared by all.

This is a new country, really, with its future before it and with room in time and space to care for more than just the developments which solve present or temporary economic problems. It is not necessary for this Nation to narrow water development to irrigation only or hydroelectric power only. We should look far to the future and for the benefit of our civilization mold water development for the preservation and improvement of esthetic, recreational, and fish and wildlife values as well.

The needs of mankind include recreation, as well as domestic and industrial requirements. "Man does not live by bread alone" is a concept that should be embodied in a strong national policy on water development.

Thank you very much.

(The prepared information referred to follows:)

WATER PROBLEMS OF NATIONAL INTEREST AFFECTING CALIFORNIA FISH AND WILDLIFE AND OUTDOOR RECREATION

RECENT ENACTMENTS BY THE CALIFORNIA LEGISLATURE

(1) Added section 1243 to the California Water Code in 1959:

"The use of water for recreation and the preservation and enhancement of fish and wildlife resources is a beneficial use of water. In determining the amount of water available for appropriation for other beneficial uses, the State water-rights board shall take into account, whenever it is in the public interest, the amounts of water required for recreation and the preservation and enhancement of fish and wildlife resources.

"This section shall not be construed to affect riparian rights."

(2) Added (1957) and amended (1959) section 1257 to the California Water Code:

"In acting upon applications to appropriate water, the State water-rights board shall consider the relative benefit to be derived from all beneficial uses of the water concerned, including, but not limited to, use for domestic, irrigating, municipal, industrial preservation of fish and wildlife, recreational, mining, and power purposes, and may subject such appropriations to such terms and conditions as in its judgment will best develop, conserve, and utilize in the public interest the water sought to be appropriated."

(3) Added section 233 to the California Water Code:

"No plans or proposal for authorization of a project for construction or operation by the State shall be submitted to the legislature by the department of water resources unless the plans or proposal includes (1) the comments and recommendations, if any, of the department of fish and game, and (2) provision for any water or facilities necessary for public recreation and the preservation and enhancement of fish and wildlife resources that the department of water resources determines to be justifiable in terms of statewide interest, and feasible as a nonreimbursable cost of the project."

(4) The Davis-Grunsky Act (California Water Code, secs. 12880 through 12891.1), enacted by the 1959 legislature, provides the mechanics and the funds for a large program of local water development. It is particularly significant that, among other things, this State aid to local projects program provides for grants for (*a*) the part of construction costs of the project properly allocated to the enhancement of fish and wildlife that are incidental to the primary functions of the project, and (*b*) the construction cost of the dam and reservoirs of the proposed project properly allocated to recreational functions of statewide interest that are incidental to the primary functions of the project.

ENACTMENTS BY THE CONGRESS

(1) On the Federal level we have seen further strengthening and improvements in the Fish and Wildlife Coordination Act (Public Law 85–624).

(2) Amendments to the Watershed Protection and Flood Prevention Act (Public Law 566) provide for works of improvement such as additional storage capacity in reservoirs, modification of reservoir structures, stream-channel improvement, and marsh development for enhancement of fish and wildlife.

Special funds have been appropriated by Congress in recent years.

An excellent example is the Washoe project of the Bureau of Reclamation which includes the development of Prosser Reservoir for flood control and fisheries exchange water. The latter will provide for improvement of flows in the Truckee River, once famous as a fishing stream but reduced in quality in recent years by adverse flow conditions caused by part Federal and local water-development projects.

(3) Recent sessions of Congress have seen many bills introduced to aid in land and water development for recreation and fish and wildlife. The bills designed to set aside areas for their esthetic value, or to give special protection to areas of particular resource value, even though such values cannot be expressed in precise monetary terms, are evidence of this growing recognition of the need to provide the basic elements of land and water for maintenance of fish and wildlife and providing recreation.

CALIFORNIA WATER DEVELOPMENT PROBLEMS

Before extensive water and land development took place in California, its drainage basins were able to support rich and varied fish and wildlife resources. Many of these resources existed in abundance because of the natural conditions peculiar to the basins at that time.

Most streams tributary to the ocean supported tremendous runs of salmon and steelhead. Migration of these fish into fresh-water streams for the purpose of spawning is necessary for perpetuation of the population. Salmon seek clean gravel areas with appropriate water depths and velocities in which to lay their eggs. Soon after spawning, all of the adults die. The eggs remain in the gravel for several months before hatching. Later the young salmon migrate downstream to the ocean. Salmon live for several years in the ocean and then return to their native streams as mature adults to complete the cycle.

These streams also supported migratory trout which we call steelhead. Steelhead migrate upstream during the winter months to the smaller tributaries. They spawn in the early spring. Some of the young migrate downstream to the ocean with the high spring flows, but many remain in the stream until the

freshets of the following winter. The adults do not necessarily die after spawning and may return to spawn several times. Inland tributaries in the mountain areas supported resident trout populations. Catfish, black bass, striped bass, bluegill, and other species were introduced to the lower streams and lakes and soon supported popular fisheries.

In the valleys, floodwaters often covered low areas each year creating marshes, lakes, and sloughs which were important waterfowl habitat. For centuries ducks and geese used these marshes as a winter refuge, and many remained to use them as nesting areas. The abundant wild foods and shelter provided by these areas made the Central Valley of California the most important wintering area along the Pacific coast for waterfowl migrating south from Canada.

As the basins began to be developed, people at first became dependent on our wildlife resources for food, and later became more and more dependent upon them for recreation. Most desirable species were at one time harvested commercially, but many became so valuable as sport species they could no longer withstand the pressures of both types of harvesting. Salmon still support commercial and sport fisheries of great value.

With the increase in population and the development of the basins, it became necessary to control floods; to provide irrigation water during the summer months and in drought years; and to generate large quantities of electricity to provide power for lights, machines, and industry. (See appendix chart B–2.)

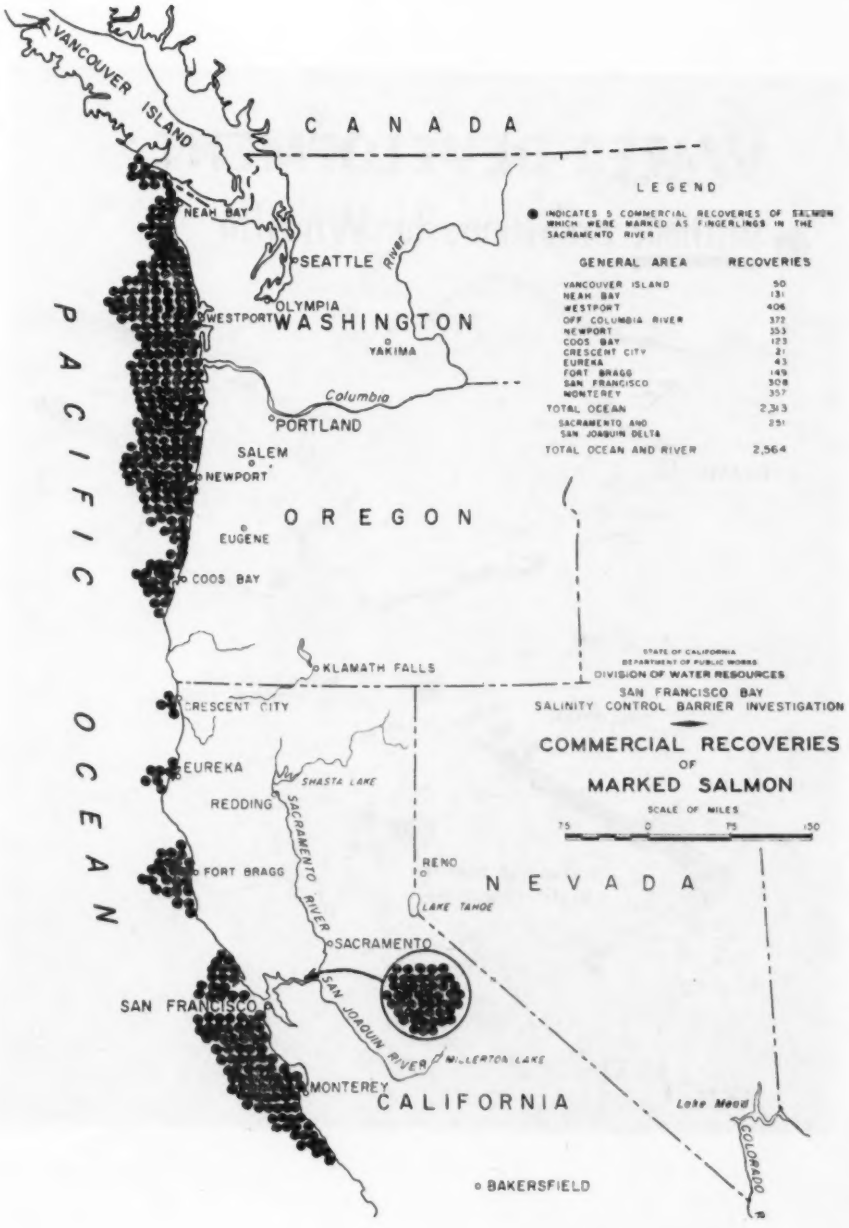
The key unit of a typical development of such a basin is the large reservoir which can control floodflows and store water for later irrigation, domestic, hydroelectric, or industrial use. Control of floods permits the marsh areas to be reclaimed for agricultural use. Diversion of water for irrigation makes farming possible on an intensive scale. Development of municipal water promotes rapid growth of communities and industry.

Unfortunately, these benefits of water development have often been achieved without consideration of the effects on fish and wildlife resources.

With the loss of marsh and natural feeding areas, the numbers of waterfowl are reduced. The dams act as barriers to the migration of salmon and steelhead and flood out their spawning gravels. Streams developed for power and irrigation are left dry or without sufficient flows of water to support trout or salmon. In many areas, sewage and industrial wastes are disposed of into the streams with little regard for their effect on other water uses. (See appendix chart B–3.)

Water uses and developments need not be disastrous to fish and wildlife resources. With the maintenance of suitable flows of good-quality water below dams and diversions; construction of fish ladders over dams to provide access to remaining spawning areas; construction of fish hatcheries or artificial spawning areas to take the place of natural spawning areas destroyed; construction of fish screens to prevent loss of young fish, the fisheries resources can be maintained and even enhanced.

Land can be set aside and maintained as waterfowl refuges and hunting areas. Such areas can also furnish food for waterfowl and protect agricultural crops from depredation. Wastes can be made harmless by proper treatment, or they can be disposed of in some other manner other than into State waters. Trout fishing streams can be maintained if a suitable flow is left below the diversion dams.


VANCOUVER ISLAND
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EUGENE
COOS BAY
KLAMATH FALLS
CRESCENT CITY
EUREKA
SHASTA LAKE
REDDING
SACRAMENTO RIVER
FORT BRAGG
RENO
NEVADA
LAKE TAHOE
SACRAMENTO
SAN FRANCISCO
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Lake Mead
COLORADO
BAKERSFIELD
PACIFIC OCEAN
LEGEND
● INDICATES 5 COMMERCIAL RECOVERIES OF SALMON WHICH WERE MARKED AS FINGERLINGS IN THE SACRAMENTO RIVER
GENERAL AREA RECOVERIES
VANCOUVER ISLAND 50
NEAH BAY 131
WESTPORT 406
OFF COLUMBIA RIVER 372
NEWPORT 353
COOS BAY 123
CRESCENT CITY 21
EUREKA 43
FORT BRAGG 149
SAN FRANCISCO 308
MONTEREY 357
TOTAL OCEAN 2,313
SACRAMENTO AND SAN JOAQUIN DELTA 251
TOTAL OCEAN AND RIVER 2,564
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES
SAN FRANCISCO BAY
SALINITY CONTROL BARRIER INVESTIGATION
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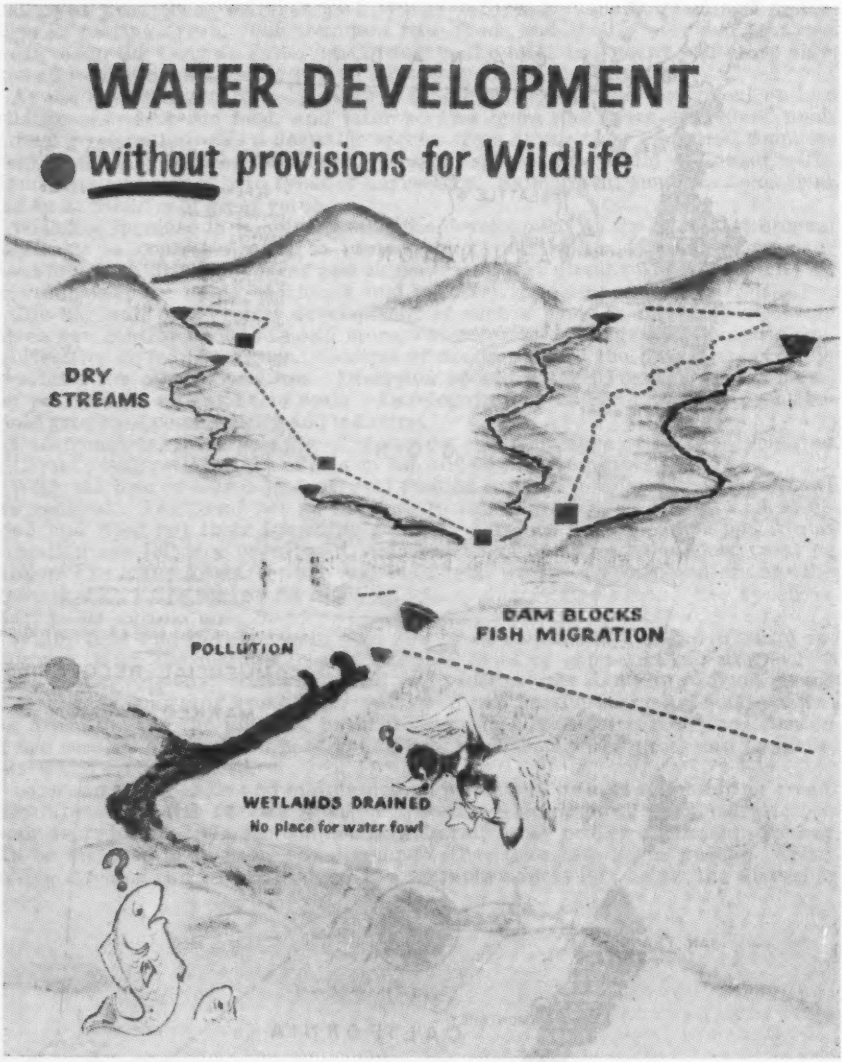
WATER DEVELOPMENT
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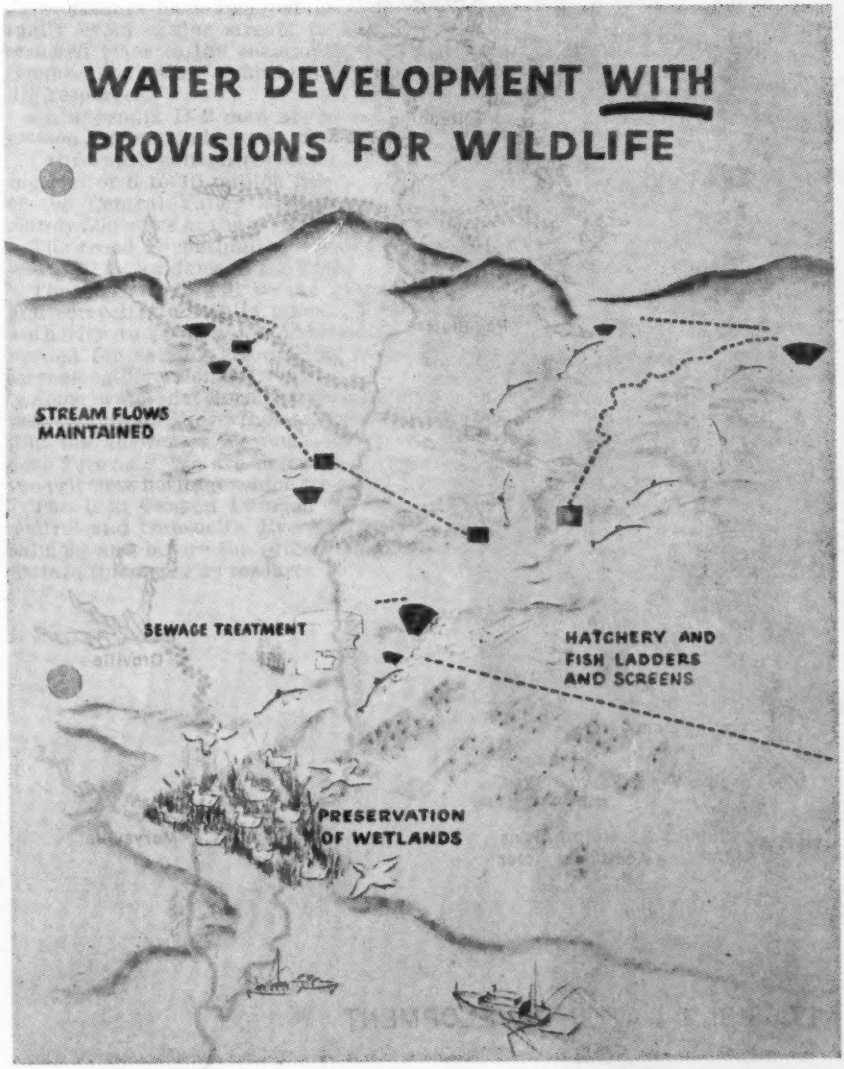
DRY STREAMS
DAM BLOCKS FISH MIGRATION
POLLUTION
WETLANDS DRAINED
No place for water fowl



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POSSIBLE WATER DEVELOPMENT
FOR
SALMON STREAM ENHANCEMENT
SACRAMENTO RIVER BASIN

SALMON PROBLEMS

Historically, California was vested with a large and valuable salmon resource. All of the streams and tributaries you see on appendix D–1 map were spawning streams of central and northern California.

About 1900, reclamation and waterdevelopment activities moved into high gear. Private, municipal, and Federal water supply, flood control, and power developments have resulted in the construction of one or more dams on virtually every major stream in the Central Valley. Many of these were constructed prior to the enactment of legislation acknowledging streamflow maintenance and other conditions for mitgating and preserving the fish and wildlife resources.

On appendix D–2 map are shown the streams which no longer contribute to salmon production because of water-development projects.

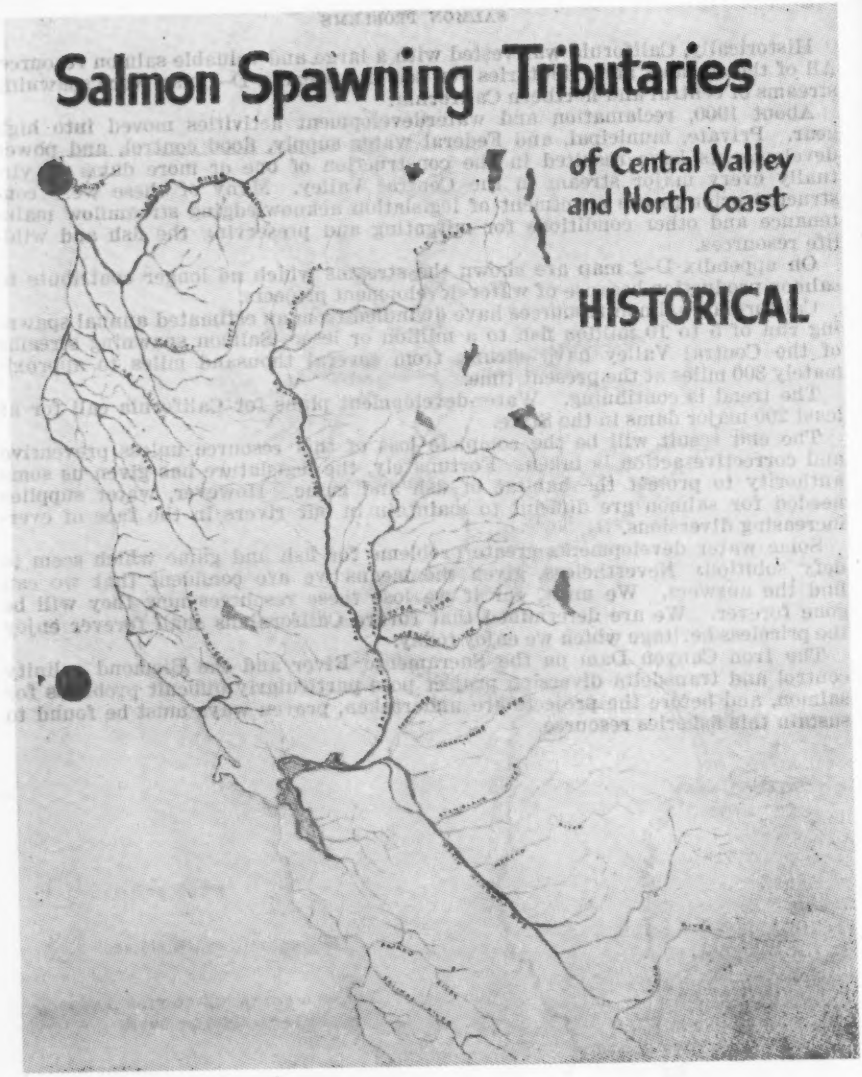
California's salmon resources have dwindled from an estimated annual spawning run of 5 to 10 million fish to a million or less. Salmon spawning streams of the Central Valley have shrunk from several thousand miles to approximately 300 miles at the present time.

The trend is continuing. Water-development plans for California call for at least 200 major dams in the State.

The end result will be the complete loss of this resource unless preventive and corrective action is taken. Fortunately, the legislature has given us some authority to protect the habitat of fish and game. However, water supplies needed for salmon are difficult to maintain in our rivers in the face of ever-increasing diversions.

Some water developments create problems for fish and game which seem to defy solution. Nevertheless, given the means we are confident that we can find the answers. We must, for if we lose these resources now they will be gone forever. We are determined that future Californians shall forever enjoy the priceless heritage which we enjoy today.

The Iron Canyon Dam on the Sacramento River and the Biemond salinity control and transdelta diversion project pose particularly difficult problems for salmon, and before the projects are undertaken, proven ways must be found to sustain this fisheries resource.


Salmon Spawning Tributaries
of Central Valley
and North Coast
HISTORICAL

The CHAIRMAN. Thank you very much, sir, for an excellent statement.

Any questions, Senator?

Senator KUCHEL. The next witness will be Mr. Rex B. Goodcell, Jr., sitting as a member of the California bar, a member of the staff of the city attorney's office here in Los Angeles, who will read a statement of Mr. Samuel Morris, who is unable to be with us here today.

I have a letter from William S. Peterson, general manager of the Department of Water and Power of the City of Los Angeles, which I will place in the record at this time.

(The letter referred to follows:)

DEPARTMENT OF WATER AND POWER,
THE CITY OF LOS ANGELES,
Los Angeles, Calif., October 16, 1959.

Hon. THOMAS H. KUCHEL,
Hon. CLAIR ENGLE,
The Select Committee of the U.S. Senate on National Water Resources, Los Angeles, Calif.

DEAR SENATORS: Thank you for your kind invitation under which the department of water and power might present a statement to the Select Committee of the U.S. Senate on National Water Resources.

Due to his long familiarity with the national water-resources problem, Mr. Samuel B. Morris was designated as the one to present the statement for the department of water and power to your committee. Unfortunately, due to previous commitments, Mr. Morris is unable to present his statement personally, and I have requested Mr. Rex B. Goodcell, Jr., assistant city attorney, to read Mr. Morris's statement, if that meets with your desire.

In the event that your committee would wish to have the opportunity to ask Mr. Morris questions concerning his statement he will be pleased to attend one of the later meetings of your committee in some other region of the United States to discuss these matters with you.

We are pleased to have the opportunity of presenting a discussion on these matters.

Sincerely,

WM. S. PETERSON,
General Manager and Chief Engineer.

STATEMENT OF REX B. GOODCELL, JR., ASSISTANT CITY ATTORNEY, LOS ANGELES

Mr. GOODCELL. I am Rex B. Goodcell, Jr., assistant city attorney, Los Angeles.

In view of the fact that the city attorney of Los Angeles is in Washington, D.C., and because the general manager of the department of water and power had a prior appointment, I have been asked to make this statement to the committee.

In response to an invitation from the Senate select committee, I am pleased to appear before your committee in behalf of the Board of Water and Power Commissioners of the Department of Water and Power of the City of Los Angeles.

The department of water and power is established in the charter of the city of Los Angeles to serve water and electricity for all purposes within the city of Los Angeles. It owns and controls its principal sources of water, hydroelectric and fuel-generated power supplies. It purchases water and some unused power from the Metropolitan Water District of Southern California, of which it is a founding member. Electric power is also purchased from the Hoover Dam and powerplant of the U.S. Bureau of Reclamation. The department

cooperates with the cities of Pasadena, Glendale, and Burbank by the transmission to each of them of Hoover power over its high-tension transmission lines from Hoover Dam. The Department also has major electric transmission interconnections with the Southern California Edison Co. and the California Electric Power Co.

Annual capital expenditures of the department of water and power average $20 million per year for the water system. This expenditure is almost entirely for local storage, distribution, and general facilities. Power-system expenditures for the next 5 years will average an estimated $50 million per year, of which a substantial part is for additional generating capacity. This expansion of water and power is financed without any burden upon the general taxpayer by the issuance of revenue bonds, direct revenues, and some service charges accounted as contribution in aid of construction.

Roughly, 50 percent of capital construction costs are met by the issuance of revenue bonds. Since 1947 a charter provision prohibits the issuance of ad valorem bonds. All the costs of operation and maintenance as well as bond servicing and other capital expenditures are made from revenues collected from water and power sales. The credit of the department of the city is good. Accordingly, the city and the department are in position to meet the cost of water development and water distribution in our city. Approximately two-thirds of the water presently used by the city is transported by the Inyo-Mono Los Angeles aqueduct, which water produces en route annually a gross average in excess of 856 million kilowatt-hours of power.

The department of water and power financed and built its own 240-mile Los Angelest aqueduct to bring water from the Owens River. Water was first delivered from this source in 1913. Later, water from Mono Basin was brought an additional 100 miles into the aqueduct. This water, with local supplies, is sufficient for 2 million population. Los Angeles' present population is 2,400,000. The additional water requirements for this growing population are supplied from the Metropolitan Water District.

In 1928 Los Angeles joined with 12 other cities in forming the Metropolitan Water District of Southern California to bring water 300 miles from the Colorado River to this city. A bond issue of $220 million was voted in 1931, and water was first delivered in 1941. The Colorado River water is regulated by Hoover Dam, built by the U.S. Bureau of Reclamation, and the cost of which is being repaid with interest by the water and power users.

The district has expanded to include 86 cities from Los Angeles to San Diego and has a present population approaching 7 million. The district is now completing the expenditure of an additional $200 million to provide additional pumps, penstocks, and siphons to bring the Colorado River aqueduct up to its full capacity of 1,600 cubic feet per second or more than 1,000 millions of gallons per day.

While Los Angeles' rights to this water, measured by payments on the capital account by taxes, are sufficient, with its other water resources, to meet its own requirements to 1985 or later, we recognize that the total capacity of the aqueduct will be fully utilized by the large membership of the district by about 1970–71. Accordingly, the city of Los Angeles and its department of water and power, with member public agencies of the Metropolitan Water District, are look-

ing to the Feather River-delta diversion projects authorized by the State of California in 1951, and for which a bond election for $1,750 million has been called for the general election, November 1960. In addition, $200 million of oil revenues of the States have already been pledged and future oil revenues will be devoted to State water development.

We understand the State of California has fully outlined this huge multiple-purpose water project to your committee. Accordingly, we will not describe it further here. We do wish to emphasize its great importance to Los Angeles and southern California, and the entire State.

Senator KUCHEL. Has an official position been taken by the department with respect to this bond issue, Mr. Goodcell?

Mr. GOODCELL. Yes. The board of water and power commissioners approved the senate bill 1106 authorizing the bond-issue presentation to the people subject to certain technical amendments. The legislature did not adopt those technical amendments and no further action has been taken by the board officially since then. Generally speaking, the board is for water development upon such terms as will best serve the people of Los Angeles. I believe I might say that we feel there are certain technical amendments that perhaps would improve the situation. I believe I can say that the board feels that certain ground rules should be established so that we would know what the terms of the contracts would be before the matter is submitted to the people of California.

Perhaps you may ask why we are looking to the State rather than to the United States for such a large undertaking. First, we believe the service of municipal and industrial water supply, one of the major purposes of this project, is a local responsibility and should be paid for by those who receive the benefits. This has been the historic policy with us, as it has been with the cities and local agencies throughout the United States.

Another important factor is that the State will assume a public utility type of responsibility of continuing to build sufficient works so that there will always be sufficient water at the Sacramento-San Joaquin Delta to meet all water requirements of the areas of deficiency whose demands will continue to grow, and thus permit areas of origin on initially developed streams to increase their withdrawals of water. The U.S. Government has repeatedly stated that it will build projects but it will not assume the public utility responsibility for developing water or power on time to meet growing demands. It has rightly said this is the responsibility of the States and local agencies.

California Senators Thomas Kuchel and Clair Engle have introduced S. 13 by which the United States may cooperate with the States and local public agencies in the development of multiple-purpose water projects where a major use is for municipal and industrial water supply. I should like to address a few remarks in support of this legislation.

Increasingly throughout the United States, domestic and industrial supply is of growing importance which must be coordinated in the planning and development of drainage basins for their most economic use. Domestic and industrial water supply entities have historically paid their own way as local public or private agencies, and have not

been aided by Federal or State subsidy. It is important to the general taxpayer that such policies be continued.

On the other hand, the U.S. Congress has been called up to appropriate billions of dollars for navigation, flood control, irrigation, and power projects. Current annual budgets for such are of the order of a billion dollars per year and yet it requires many years to complete large projects, as funds are not adequate to meet desirable construction programs.

In the past the States have not, themselves, been engaged in direct water resources development by financing, construction, and operating works. However, the State of California, as heretofore noted, is now embarking upon the construction of the $2 billion Feather River and delta diversion project involving not only flood control, irrigation in the Sacramento and San Joaquin Valleys, and power, but also domestic and industrial water supply and some irrigation for southern California, the central coastal area, and the north and south San Francisco Bay areas, which are the major elements of the project—$130 million of the total is allocated to local water projects. This will be the first major multiple-purpose water project under construction by any State.

The time is most opportune to inaugurate the proposal that the United States makes available to States or local public agencies undertaking the construction of multiple-purpose water projects, the same amount of funds representing the Federal interest as the Government would invest or loan if the multiple-purpose water project were to be built by an agency of the United States.

The example afforded by assistance to the State of California, by making such funds available to meet the Federal interest, when the State engages in the construction of its first multiple-purpose water project would be a great stimulus to other States to assume their proper roles in coordination and development of their State water resources, and in preserving the precedent and policy that domestic and industrial water supplies will be developed by local agencies.

In the California State project we understand funds to cover the cost allocation for flood control of Oroville Dam, not to exceed $100 million may be provided by specific Federal appropriation, but could be authorized under such general legislation as S. 13, if approved.

S. 13 would be of general application and would include nonreimbursable grants for navigation, fish and wildlife, as well as for flood control. In the Western States, it would provide loans without interest for irrigation under reclamation law, and loans with interest for lands in excess of the 160-acre limitation, in the same manner as now provided in the "Small Irrigation Projects Act."

Under this bill, States and local agencies would carry the full allocated costs for municipal and industrial water supply and hydroelectric power for multiple-use water projects constructed by them, thus eliminating the necessity for any Federal appropriations for such purposes.

We urge your favorable consideration of the Kuchel-Engle bill S. 13.

Another matter that should be discussed is that of threatened encroachment on State water rights by the Federal Government.

It has been the policy of Congress and of the several Federal agencies engaged in the construction of water-use and water-control proj-

ects to comply with local laws governing the appropriation and use of water resources within the several States.

However, on June 6, 1955, the U.S. Supreme Court handed down a decision in the case of the *Federal Power Commission* v. *The State of Oregon* (349 U.S. 435, better known as the Pelton Dam decision). In this decision it is held that in the withdrawal or reservation of Federal public lands, the United States retained jurisdiction over the use of water theretofore believed to have been granted to the State under the Desert Land Act and other related acts of Congress.

These Federal withdrawals generally antedated the Reclamation Act of 1902 and the construction of the major water projects of the Federal Government. This would appear to be a hazard to local and State water rights. The major portion of the water supply of the city of Los Angeles, the State of California, and of the Western States runs off lands in the ownership of the United States.

Accordingly, we support H.R. 4567, S. 851, and other bills similarly concerned with the laws of States with respect to water rights and the appropriation of water for beneficial uses.

We deeply appreciate the opportunity your committee has given us to present this testimony.

I might state that Mr. Morris will be glad to appear at a later meeting of the committee to personally answer questions if the committee so desire.

Senator KUCHEL. Thank you, Mr. Goodcell. As usual, that is a very excellent statement by Mr. Morris.

Senator Engle, any questions?

Senator ENGLE. I would like to make this observation. I regard Mr. Morris as one of the outstanding water experts in the United States and his statement was no exception to the high quality of workmanship that he always puts into a statement before a committee.

I was especially grateful, too, that he took occasion in this statement to mention the legislation that Senator Kuchel and I have introduced, which would lay a broad basis for Federal participation in State-constructed projects. This legislation has national significance and does not apply to the western part of the United States. I think if we get on the ball with reference to this bill that we can make a significant and historical change in the relationship between the Federal Government and the States. The water problems are not limited now to the areas west of the 98 median. They have them in the East and they have them in the South. Their problems are industrial and municipalwise more than water for irrigation. This bill fits their difficulties and also fits ours.

We have not tried to move this legislation this year. We asked for Department reports and we did not get any Department reports. But we will get them next year if we have to haul those fellows up by the scruff of their neck and put them in a witness chair and make them testify. But we had our hands fulls with the San Luis project. There are about so many bills you can run through at a time. We thought we just about wore out our welcome around there on the San Luis project, which had priority.

Next year, with the help of my distinguished colleague I expect to crank up that bill and really get it going. I hope, too, that this select committee when it makes its recommendations will deal specifi-

cally with the very type of formula that is contained in that legislation.

Senator KUCHEL. That is a very good statement, Senator, and reminds me of just one example of the growing problem across the country.

One of the purposes of multipurpose Federal projects traditionally has been navigation. So a certain amount of water has been required to run down an interstate stream or any other stream that is navigable in character for the purpose of letting vessels ply those waters.

Now, however, the use of water for other purposes such as my able colleague has suggested, the purposes of providing drinking water to municipalities, has created a very grave problem on the great rivers and in the great river basins of this country. Suggestions are now made for a term that was fairly new to me, slack water navigation, under which these great interstate streams of ours will have to have locks, like you see on a canal, in order to continue the responsibility of the Federal Government in the field of navigation and yet at the same time make available greater amounts of water for higher priority purposes. I also recall in that connection that we will have a quarter of a billion people in this country in another 25 years and our water consumption will have increased in excess of 50 percent. All the water in the Potomac River that passes our Capital City within 25 years will have been consumed for purposes of carrying on the life and livelihood of our Capital City. That is the problem; that is the magnitude of it.

Senator Engle and I in S. 13 have a piece of legislation in the public interest, to encourage municipalities and States to play their part in a partnership with the Federal Government.

Senator ENGLE. May I make an observation? Someone at the press table inquired about my reference to the 98th meridian. The reclamation law has traditionally applied to that area west of the 98th meridian, which goes through the eastern part of North Dakota and down through the eastern part, I think, of Oklahoma. So reclamation law, which was passed in 1912, is west of that area. What I am saying is that this legislation is important to every part of the United States, whether west of the 98th meridian or not.

Mr. GOODCELL. I might merely state this. We feel that Senator Kuchel, and you, Senator Engle, should be commended for having introduced S. 13, inasmuch as we feel that if it is adopted it would provide a policy under which we could have more coordinated Federal-State and local water development so needed in the Western States and it would also provide one thing that is essential, as we see it, to future water development and that is more uniformity for State and Federal participation in developing these water resources.

Senator KUCHEL. Thank you very much, sir.

The chairman of the Colorado River Board—what is the correct name?

Senator ENGLE. There he is.

Senator KUCHEL. You do not desire to make a statement for the record?

Mr. SIMPSON. No; but I do wish to thank the committee on behalf of the board for the opportunity.

Senator KUCHEL. Very good, sir.

Next, Mr. Robert Radford, chairman of the Los Angeles County Watershed Commission.

Mr. Radford.

STATEMENT OF ROBERT RADFORD, CHAIRMAN, LOS ANGELES COUNTY WATERSHED COMMISSION

Mr. RADFORD. Mr. Chairman, and Senator Engle and Senator Young, this statement is rather a brief statement, but I felt it ought to be presented at this hearing because what I want to talk about a little bit is about watershed management.

I happen to be the chairman of the watershed commission of the county and also president of the Watershed Fire Council of Southern California, which includes the eight southern counties.

An unusual set of factors existing in Los Angeles County and southern California has resulted in the problem of watershed management assuming an importance in this area unequalled anywhere in the country, perhaps in the world.

This statement, as startling as it may seem, can, however, be proven when all the factors involved are examined.

First and foremost is the fact that within the boundaries of the four national forests of southern California and the privately owned primary watershed adjacent thereto, is found what has been recognized and declared as the most valuable watershed in the entire Nation.

The value of this watershed stems from the fact that nowhere else in the Nation, and also quite possibly in the world, are there such vast metropolitan areas so directly affected by their adjacent watershed lands.

Southern California's topography is such that its more than 8 million population is concentrated in small coastal basin areas and mountain valleys which have intensive industrial and agricultural development. Immediately bordering these small, heavily populated areas are steep, towering mountains with highly erodible soil and highly flammable brush cover.

These inhabited areas have a semiarid climate, and depend heavily upon these watershed lands for their water supply. About 7.3 million acres, or 25 percent of the total land area, is considered to be water-yielding area. Despite vast expenditures for water development and bringing of water from the Colorado and Owens Rivers, about three-fourths of the total annual water used in the south coastal basin still comes from these local watersheds.

Approximately 90 percent of the local water is produced from 3.5 million acres classed as major water-yielding areas. Most of this watershed is on national forest land. Thus, it is estimated that the four national forests of southern California produce roughly half of the total water used in the south coastal basin, which includes the Los Angeles, San Diego, and San Bernardino metropolitan areas.

In three of the eight southern California counties—Ventura, Santa Barbara, and San Luis Obispo—there is no imported water available, and no prospects of any in the near future. The watershed in these three counties, upon which they depend 100 percent for their water supply, have been called the largest pile of flammable brush in south-

ern California. These brushlands, which comprise the Los Padres National Forest, are also very steep and highly erodible.

The water problem in these three counties and throughout southern California is further aggravated by the fact that the annual use of local water from underground basins has exceeded the safe yield for a number of years. In Los Angeles County alone, the use of underground water has exceeded the safe yield by some 230,000 acre-feet per year until an overdraft of some 2 million acre-feet of water now exists.

This steady depletion of underground water reserves, coupled with a soaring population, greatly intensifies the importance of the watersheds of southern California. The social and economic structure of the whole area is basically dependent upon an adequate water supply, which in turn requires the highest level of watershed fire prevention and control, together with proper management and utilization.

We see how important watershed management becomes when it is pointed out that due to climatic conditions creating a year-round fire season, highly inflammable vegetation, the heavy population pressure already mentioned, difficult terrain, and inadequate fire prevention and control facilities, fires in the four southern California national forests in 1958 accounted for 52 percent of the total national forest area burned in the 144 national forests of the United States.

But a mere recital of statistics on area burned does not begin to describe the actual loss sustained. The floods, erosion, property damage, and water loss which inevitably result from fire-destroyed watershed, constitute a direct threat to the continued prosperity of southern California.

In Los Angeles County, which contains 3,951 square miles of land, Angeles Forest comprises some 27 percent of the total land area. This national forest provides the bulk of the county's watershed. Rapid population expansion has resulted in homes and subdivisions being built immediately below these watershed lands, in canyons, and even in the brushlands themselves.

Recognizing the critical situation existing in the forests of southern California, a special subcommittee of the House Interior and Insular Affairs Committee met in Los Angeles in October 1957.

Chairman Clair Engle and his committee investigated the need for forest fire control in this region and made a number of findings which can be succinctly summarized, to use Senator Engle's words, in one statement:

> Forest fire problems in southern California are more acute than in any other part of the country and require special consideration.

Of primary importance is the Engle committee's first recommendation that an annual appropriation of $2,375,000 be earmarked for the four national forests of southern California for fire prevention. This sum was estimated by the Forest Service in 1954 to be the additional amount needed annually for a 10-year period to bring the forests of this region to an adequate level of fire protection.

However, the funds appropriated by Congress since 1954 have fallen far short of this amount. At the end of the 1959 fiscal year, the four southern forests had received only one-third of the amount estimated in 1954 to be the minimum necessary to maintain this adequate level of fire protection.

In our program of seeking more adequate fire protection for our watershed areas over the past 5 years we feel that we have also been making a direct contribution to insuring and stabilizing our local water resources.

It is a well-established fact that proper land management and utilization of watershed areas is a prerequisite to safeguarding water supplies.

Because of our interest in these two basic problems, we requested this opportunity to present testimony before your committee, and sincerely hope that your findings will recognize the direct relationship between watershed utilization and protection and water resources.

Thank you very much for having had the opportunity.

Senator KUCHEL. Thank you very much, Mr. Radford.

Mr. RADFORD. I hate to tell you that we have a problem right now. I guess you know.

Senator KUCHEL. We saw it yesterday as we flew down. It is unfortunate.

Mr. RADFORD. May I make this one comment, Mr. Chairman?

I happen to be a water man, also. That area in the upper reaches of the Arroyo Seco that was burned is unquestionably the most—well, it is probably the highest developed watershed anywhere in the world. The city of Pasadena, many of you people out in the audience may not know, started in a number of years ago and acquired the ownership of that upper reaches of the arroyos there. Through the efforts of their head of the water department, Mr. Blackburn, there was developed out of that small canyon out there a greater proportion of salvage, saving of the water, than any place else that has been recognized anywhere and that is——

Senator YOUNG. If I may, I would like to make this statement. As a direct result of the findings of the Engle committee, appropriations for fire protection in California were sharply increased, probably not all that was needed, but they were sharply increased.

I would like to take this opportunity to make this observation.

I don't suppose any State in the Union has more problems in Washington than California. You have a tremendous need for water out here. You can only get it through Federal projects. It would be nice to represent a State that did not need anything and a Congressman and Senator that could say anything he wanted to, and be just as independent as he wanted to. But your people from California have to work with all the rest of Congress, over 500 of them, and it is a constant year-in-and-year-out job. Over the years during the time I served there, since the time of Hiram Johnson, you have had some very able men. And in Senator Engle, you have one of the most able men of the Senate, a hard driver and over in the House he was chairman of the Interior and Insular Affairs Committee. He is already in that committee in the Senate and I suspect he will be on more important committees. Senator Kuchel is on the Interior and Insular Affairs Committee, probably one of the most important in the West and vice chairman of this committee, and on the Appropriations Committee where you get the money. I have worked with your people for a good many years and I think they do a tremendous job for the State of California, probably far more than the average person realizes.

Mr. RADFORD. I think that is true, Senator Young. I think this, however. It is the same old adage that we had always. Because of our tremendous need here it is necessary for us to keep that push, push all the time. As I said to Carl Schwartz of the Bureau of the Budget, I said, "You figure lots of ways. I know that we get more dollars per acre for the protection of our forest than any place else." I am talking about these four southern California forests. I said, "By the same token, if you take your sharp pencil and figure out our loss, values, in other words, the costs of this thing on an acreage basis, we are still, Mr. Schwartz, not getting our proportionate share, because there are two ways of figuring. One is just as I said in here, over half of the area of all the national forests last year was burned in these four national forests here."

When you figure that, you see, it is going to continue to try to affect the level of the amount of money that we get out here for our protection, because of the need for it, Senator Young, and I am very, very happy that you are out here. I hope you will have time enough to let some of us take you and fly you over what we have up here in the hills this afternoon or tomorrow. We will be very happy to have you. Both Senator Engle and Senator Kuchel have seen these things firsthand. But it will be nice if you had the time, we would be very happy to see that you saw this thing firsthand.

Thank you very much, gentlemen, for the opportunity of appearing.

Senator KUCHEL. Thank you very much, Mr. Radford. I might say parenthetically to my colleague from North Dakota, we thank him for his kind words.

Senator KUCHEL. The next witness is Assemblyman Carley V. Porter. If you will come forward now we would be glad to hear from you.

STATEMENT OF CARLEY V. PORTER, ASSEMBLYMAN

Mr. PORTER. You will have to excuse me. I just flew in on a plane and this San Francisco haze around here is beginning to get in my eyes.

Senator ENGLE. That is smog from that forest fire. We have something to blame it on.

Mr. PORTER. For a change, yes, Senator.

Mr. Chairman, and members of the U.S. Senate Select Committee on National Water Resources, my name is Carley V. Porter and I am chairman of the assembly water committee and formerly served as chairman of the joint subcommittee on economic and financial policies for State water projects. My statement today will be organized around the 3 years' work of these two committees.

Your select committee's announcement of hearings indicated several important problem areas in water resources development that are of special concern to California. Of particular interest are the questions you raise regarding the cost and quantity of water which is needed to permit continued future growth. Here in California the problem of cost is acute, for we have some very expensive project works planned for construction.

Earlier this year, a bill was passed by the legislature and signed by Governor Brown which set the wheels in motion for eventual sale

of $1,750 million of California general obligation bonds for water resources development. It is proposed that these bonds, plus about $200 million in cash resources, will finance a $2 billion construction program during the next 25 years.

You may judge the size of this understanding by projecting it to equivalent amounts at the Federal level. This $2 billion program is approximately the same as the annual State budget in California. The project will store and transport surplus water from northern California and deliver millions of acre-feet of it to the San Joaquin Valley and southern California. A Federal project of comparable size would cost the equivalent of 1 year's Federal budget, or about $75 billion, and would deliver water from the Columbia and Missouri Rivers to the Midwestern States and the large population centers of the eastern seaboard. Viewed in the light of this comparison you can see that the raising of the capital to construct such works and similarly the determination of repayment policies as well as the pricing of project services may vary from those now employed by Federal agencies.

In our committee work we frequently find people who recommend that California carefully copy Federal policies and thereby ignore some of the basic differences between State and Federal water resources development problems. Conversely, some wonder whether you gentlemen as Federal legislators may not, understandably, feel that we are criticizing Federal policies or are unsympathetic to them because we are evaluating them against our own peculiar problems.

So that there may be no misunderstanding, let me emphasize that I for one am anxious that the State of California adopt water resources policies that are harmonious with Federal policies. I also believe that our programs should be compatible and not competitive. We should work together toward providing the water resources development we need so badly here in California. As examples of desirable cooperation I can cite the joint Federal-State construction of San Luis Reservoir and the cooperative financing of certain research and development in saline conversion. As you may know, California has provided in this year's budget the sum of $1,600,000 for cooperative construction with the Department of Interior and the Atomic Energy Commission a pilot demonstration saline conversion plant at San Diego.

For the record, let me continue and briefly list several of the ways in which our respective approaches differ:

(1) As I have already pointed out, we plan to finance our projects through the sale of general obligation bonds. We found that we were unable to devote up to 10 percent of our State budget to water resources development in years of peak construction requirements on top of the new taxes that had to be voted this year to balance the State budget.

(2) When we use general obligation bond financing we must provide ways and means for the payment of principal and interest. Since we have not the tax revenues to construct the projects initially, we cannot assume that there will be tax moneys to repay project construction costs. This means that we must look to project revenues to recover our costs in a manner that may vary from Federal policies.

(3) Because we must look to project revenues to recover project costs, we may find that revenues, rather than benefits, may be the more appropriate guide in project formulation.

(4) Pursuant to popular demand here in California, as elsewhere, we are anticipating that recreation will become a major project purpose at some reservoirs and will be on a par in all respects with other project purposes.

(5) The furnishing of water supplies to southern California involves recognizing that municipal and industrial water supplies here in California are as important in project formulation and pricing policies as any other feature of our project development.

These are some of the major characteristics of our State program which tend to differentiate it from the Federal programs with which you are quite familiar.

You may be interested in having some indication of where we now stand in the work of our committee, which is still going on. I can sketch our program for you briefly. During the past 2 calendar years we have broadly explored Federal policies to become acquainted with them and to understand their operation. We have also tried to explore some of the major economic and financial problems confronting State water projects. Finally, we have tried to determine the attitude of the California public toward our major project repayment problems. Surprisingly enough, we found that most witnesses before our committees supported a policy of full repayment of State project costs by project beneficiaries.

Out of all this exploration came a preliminary study. This is not as yet a committee report but is an effort to organize and integrate what we have learned so that it may be evaluated and further refined. A substantial number of copies of this study have been furnished to water agencies, economists, and other interested parties for criticism and comment. We are now collecting and evaluating these criticisms and comments in the hope that they will validate our work or correct our errors.

From all of this work and also from a series of hearings we are now holding throughout the State on certain special problems such as acreage limitation, power preference, and contract policies covering the sale of State project services, we hope to put together a final report which will recommend comprehensive, equitable, and sound policies for the State to follow in its water resources development program.

In conclusion I want to point out here that one of the directives in the resolution which authorizes our committee work instructed us to reconcile any variations between existing Federal and proposed State policies. You may be assured that this is an important objective which our committee keeps uppermost in mind, and when we do make our recommendations to the legislature I am sure they will contemplate a closer, harmonious and workable Federal-State relationship in water resources development.

Senator KUCHEL. That is a very fine statement, Mr. Porter, and I must say that your reference to San Luis as a cooperative venture between the State government and the Federal Government prompts me to say that we were successful in the Senate over mounting opposition, first, because all sections of California approved what we were trying to do. There was no opposition to the $400 million bill that Senator Engle and I sponsored at the request of the people of California, and with the help of men like the gentleman on my right, Senator Young, we are able to prevail, although we lost, I regret to

say, on the amendment, which while perhaps not mortal was at least difficult for us to, perhaps impossible for us to approve the amendment. At any rate, it becomes exceedingly difficult for any State to receive in this field the amount of cooperation that it desires. There is a more competitive situation, which is another reason why we all need to pull together in this business.

Senator Engle.

Senator ENGLE. I think I have no comment, except to compliment my friend for his very excellent statement.

Mr. PORTER. Thank you, Senator.

Senator ENGLE. With respect, of course, to the coauthor of this important legislation passed in this session of the State legislature, which is going to make a lot of water history around here, one way or another——

Mr. PORTER. There are sections in which that is a rather dubious honor, Senator.

Senator KUCHEL. Senator Young?

Senator YOUNG. No thank you.

Senator KUCHEL. Thank you very much.

Mr. PORTER. Thank you.

Senator KUCHEL. Are there any other members of the State legislature present?

Representing the several boards of supervisors of the southern California counties, a number of county supervisors are present.

The Honorable Stephen Riess, member of the board of supervisors of the county of Santa Barbara.

In that connection may I say that a very longtime friend of mine, the Honorable S. Wesley Break, who was chairman of the board of supervisors of the county of San Bernardino, and a longtime enthusiastic supporter of water conservation legislation, is here. He has a prepared statement which in the interest of time he has asked this committee to set forth in the record in full and he will not read it. It will be received and placed in the record at this point.

(The prepared statement follows:)

PREPARED STATEMENT OF THE BOARD OF SUPERVISORS, SAN BERNARDINO COUNTY, CALIF.

Gentlemen, the board of supervisors of the county of San Bernardino, State of California, expresses deep appreciation to your honorable body for the invitation extended and opportunity to afford brief comment on the subject of water resources, conservation and water problems as affects this county and the national interests.

This board is most pleased by the interest of Congress, displayed through the establishment of your committee, in the field of water resources and conservation with consideration at national level. With the tremendous growth and expansion nationwide, it is evident that water supply, one of the most valuable assets of this Nation, must be hoarded, conserved, regulated and adequately distributed if the overall needs of a vigorous Nation are to be met. The very crucial and real water deficiencies of southern California, which are a matter of the most widespread record with little need for further emphasis, is a typical example of need for a water resources program at higher than local level, as the solution cannot be there obtained. Southern California, with its problem and this county therein being most vitally affected, is only typical of other vast areas of the United States equally concerned or certainly to so become.

The solution of the vast problem, geographically, extends beyond limits of counties and even States or greater subdivisions and consequently assumes national proportion. The magnitude and complexity of the problems of water resources is also such that it appears to be increasingly necessary to consider

further the financial aspect of the major problems as of national character. This can be considered particularly true with the pace of development and communication rapidly, if not already in vast areas, eradicating the ancient concepts of self-sufficient communities or regions. On such account, the general prosperity of the people as a whole becomes inseparable from the general welfare of all portions of the Nation.

With particular reference to the county of San Bernardino, the largest within these continental United States, some 20,000 square miles in extent and with an equally extensive water supply problem, looking to the future will find it necessary to call upon water resources activity of the widest extent and character to fulfill requirements both as to quantity and quality for all purposes.

The present and once thought bountiful supplies of the county are taxed and overdrawn with a current population of 500,000 persons. With a most conservative estimate of 3,550,000 persons by the year 2020, the vivid picture is portrayed of the vastly increased water supply needs locally nonexistent; this fact applying with equal import to all of this region. The solution to this problem will be found only by the most expeditious and coordinated efforts of all agencies, local, State, and Federal. The California water plan, advocated and pursued by the State, together with maximum allotments of waters of the Colorado River, afford the mode of relief for the near future. In the case of the latter involving interstate and international complexities, it is most essential that maximum development and utilization of the water resources be assured and made available. This can only be accomplished at national level.

As to the development of the California water plan, this too will need the maximum cooperative efforts of the Federal Government if the program is to progress in step with need and growth. Flood-control projects for river control are inseparably entwined with water resources and conservation but perhaps too frequently the maximum conservation features may be sacrificed due to a present inability of local areas to separately provide the maximum features. Thus without incorporation of these features in the first instance, a most valuable feature and resource may be lost. With resources too limited to be wasted in any particular instance and the national interest involved in overall standpoint, greater Federal consideration of the factor becomes urgent.

At the more local level, as in the case of this county, flood control with great stress on water conservation is practiced to the limit of presently available funds. However, such funds are inadequate to cope with the practical necessities of the area. It is often believed that a more practical, modernized, and streamlined approach to recognition of needs for flood-control projects and assistance under the Federal program, particularly in areas such as southern California where the necessities have and continue to lag need, would enable even greater conservation of native water resources by local entities.

The valleys and even more arid parts of the county are faced with problems of water pollution or closely related aspects. The extensive underground basins and water storage therein is the principal source of presently existing water supply. With use and reuse of these waters by extraction and recharge, salt concentrations may be expected to ultimately destroy this now existing single source. Within the county there also exists subsurface water supply with natural contents of detriment. The protection and development of the existing resources may be approached through the most rapid replacement of water of high quality such as contemplated by the introduction of northern California water. However, to obtain the maximum possible future potential will require programs to combat natural detrimental aspects. Research programs at the highest level are thus necessary in leading to the future use of presently satisfactory or unsatisfactory water supplies or those destined to so become.

San Bernardino County, with its mountain and desert regions, has currently become a recreational playground for southern California. With the growth anticipated for the entire region, again conservatively estimated to attain over 22 million persons for the Los Angeles metropolitan area and adjoining vicinity by year 2020, it is imperative that recreational development of the area be expanded at rapid rates to assure to southern California the continuation of adequate facilities. Water supply availability, regulation, and control is most essential to this along with the conservation of government lands of recreational value and State and governmental assistance in their development.

Relative to specific needs for water, time elements and the associated economics for this area and at this date the engineering studies and reports of the State of California, Department of Water Resources, are considered the best data so far available. Local interests are currently engaged in evaluation of this or

special engineering study undertakings. Pending findings of any substantial deviations, the reports of the State are considered to contain the best current information available and supported accordingly.

It is with pleasure that the board of supervisors of the County of San Bernardino submits this general review for the consideration and information of your committee and look to the future with confidence and assurance that the greatest possible coordinated effort among Federal, State and local agencies will attain the necessary objectives, maximum use and conservation of local, State and National water resources.

Senator KUCHEL. Proceed.

STATEMENT OF STEPHAN RIESS, MEMBER OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SANTA BARBARA

Mr. RIESS. Thank you, Mr. Chairman and Senators.

I am here to present an alternative solution that at least should be considered in our water problems, and that is by drilling the deep seated aquifers which are enormous volumes of water available to us everywhere, almost, where there are volcanics. These are recognized by the earth scientists, by geology, and they should be and must be in the future considered.

We are running out of rivers. The excellent statement made by Mr. Jensen shows what can be done and has been done by initiative and free enterprise, and they have, no question, done a marvelous job, but still they have resorted to the 4,000-year-old principle of finding water where it exists on the surface and transporting it to the people. Actually, the principle is the same, except that modern refinements, machinery, steel, concrete, steel pipes, pumps, have replaced the donkey and the goatskin bag.

We must go down for water and I have not yet heard of water resources in any instance proposed to find new and additional water supplies. This is what I am proposing to be considered by your honorable committee.

I am leaving with you a statement which only touches lightly and is only a small capsule of the whole thing. I wish to be at any time available should you so desire to call me in, anywhere, in Washington or anywhere else. I will pay my own expenses.

I want to point out that there are millions and billions of gallons of water known to exist. The earth scientist recognizes it. If we get the geology profession and the earth scientist people into the water business alongside with the pipeline and concrete man we can solve our problems.

If our press is opening up and give the people all and the complete information as to these water problems to be solved, then we will have no problems at all, solving our difficulty.

In Europe it is being done. The University of Pisa, the University of Frankfurt, Germany, and in France, are teaching and giving courses to develop and make use of such waters.

The Russians are actually doing it. They too, like we over here in this country, have come to the realization that these tremendous volumes of water are available by reason of finding them in their mines, deep underground in solid rock and not in sand rivers or lakes.

I have submitted everything in writing to you peoplpe, to go into it all the way would take days.

Any questions you might ask I will answer. I would like to save a lot of time to give to other people who will come on. I am ready to say this is it at this time.

Senator ENGLE. Senator Kuchel stepped out briefly, but I am sure he would be glad to have your statement, and the statement will be made a part of the record.

Do you have any questions, Senator Young?

Senator YOUNG. No, thank you.

Senator ENGLE. If there are no questions, thank you very much for your statement. We certainly appreciate it.

(The prepared statement referred to follows:)

STATEMENT BY STEPHAN RIESS

INTRODUCTION

Gentlemen, my statement can only be but a summary capsule of the 25 years that I have devoted not only to the theoretical considerations of mineralogy, geochemistry, and the other earth sciences but also to the practical and successful field experience of developing pure, potable water supplies in abundance for my own properties and for many business and local government organizations.

I propose to discuss briefly the existing approach to water problems and the reasons for its inadequacy, and to present an alternative approach. After defining the term "deep-seated rock fissure aquifers" which is the very heart of my approach, I present proofs of the universal existence of rock fissure aquifers, in natural springs, in accidental occurrences, and in my own deliberate scientific work in well location and drilling over many years and in many areas. I show that this alternative water supply is economically feasible, is potable and is permanent. The program here proposed is based on the fullest use of private initiative, free enterprise, and local self-help.

EXISTING APPROACH

In ancient times, the water shortage problem was solved by moving people to the water: the people would just move to a new place where the water was known to exist and to be available for use. As communities became larger and the first cities were established, it became easier to transport water to the people than to disrupt established communities. The period of constructing dams, canals, and pipelines started, and as the demand for water became greater and ever greater so did the distance and the expense mount in an effort to procure fresh, potable water. Other than pure mechanical refinement our conventional solutions to an ever increasing need for pure water differ little from the ancient method of transporting water by muleback or the ancient aqueduct systems of the Romans.

What I am about to discuss is not an isolated occurrence. It is very strange indeed, gentlemen, that we have not progressed further in our thinking. It is notable that an American engineer received high recognition by being awarded gold medals by the Universities of Pisa and Padua for his research into the availability of the kind of water I will discuss with you shortly. Not only has there been recognition of such waters abroad, but Italian and German universities have already instituted courses of instruction and research into these waters and I have just recently learned that in the Soviet Union they are already drilling for these waters.

One of the prime factors for the existence of underdeveloped countries is their lack of adequate water supplies for both food and industrial development. Ask our International Cooperation Administration if this isn't so. I ask you, gentlemen, whether we are going to sit back and let the Soviet Union help these countries develop while our own very capable earth scientists and engineers remain helpless, not only abroad but also at home, because of our failure to recognize the existence of abundant and perpetual supplies of pure, fresh water under our very feet and throughout the world.

Here in our West, all of the water programs in the past have been temporary and shortlived. Dams silt up and large areas of land have been and are becoming denuded. Behind Hoover Dam, Lake Mead is filling with silt at the

terrific rate of more than 137,000 acre-feet annually. The dams associated with the proposed Feather River program will result in even faster silting-up. These problems do not seem to concern the proponents. The answer that I get 9 times out of 10 is: "Well, yes, but we won't be here." This answer contains the same fatal error that resulted in the demise of so many ancient civilizations and may well spell out the doom of our own.

It is this continual silting of dams that will put more than 50 percent of our municipal reservoirs out of business in a relatively short time. Our only recognized solution to date has been to find new rivers and new sites for the construction of new dams that require the lateral transportation of water for hundreds of miles to our centers of population. This increasingly becomes an expensive burden that increases our capital expenditure of labor, materials, and power.

The very existence of this committee, gentlemen, is sufficient proof that the existing approach is not adequate for handling our water problems. Now let us look at the alternatives that I propose.

RIESS APPROACH

For many years I was employed as a mining engineer in charge of underground development. A not infrequent occurrence, as mining engineers and mining geologists will attest, is the flooding of a mine when a mine shaft or a lateral drift intercepts a fault or fissure system. Often such a mine can still be worked provided the water is continually pumped off, but just as often it is found to be an impossible task, for the water comes into the mine at a faster rate than it can be pumped off. I, too, experienced this occurrence many times. Retrospection convinced me that here was a source of water that was being overlooked. Gentlemen, I turned my life around and began to study the occurrence of these waters all over the globe. After years of study and visits to the flooded mines and hundreds of large springs in the U.S.A. and Central and South America, Europe, Asia, and New Zealand, I found that a perfect pattern prevailed in regard to structural, geological, mineralogical, and geochemical principles. With this information I consulted with geologists and other earth scientists who confirmed the idea that these waters were in effect underground streams flowing through rock fissure aquifers, a term which I will explain in a moment.

I have been remarkably successful in being able to pinpoint locations on the surface of the earth, for the drilling of wells that intercept this migratory, fresh, pure water. And invariably I have been able to do this at economic depth. The San Bernardino Valley Municipal Water District has taken up my challenge by entering into a contract for me to locate and deliver to them 7,000 California inches of water. We are ready to start drilling operations as soon as permission is granted us to enter upon the lands we have selected as our sites. These drilling operations are entirely at our own risk and expense without dipping into the public coffers.

WHAT ARE ROCK FISSURE AQUIFERS?

Rock fissure aquifers are sources of pure, potable water flowing through the fissures of the otherwise solid and impermeable rocks. They are, therefore, entirely different from the conventional ground-water well which is drilled into the unconsolidated rocks, namely the sands and gravels, which are porous and permeable and hence permit the infiltration of surface waters. The conventional ground water, therefore, attempts to reach a catchment basin in which surface waters have accumulated in the past. Any additions to the amount of water thus accumulated depend on the amount of local precipitation (rain and snow) and inflow from connecting drainage systems. Those additions are often erratic, and especially in the Southwest are always insufficient. The rock fissure aquifer, on the other hand, is independent of local precipitation rates and thereby constitutes a permanent and constant source of pure, fresh water that is available in areas of erratic or insufficient precipitation. These rock fissure aquifers exist all over the world and can be tapped in southern California, all over the United States and indeed all over the world.

I ask you, gentlemen, why does interstate friction over Colorado River water need to be? Why do we have to expend tremendous energy, materials, and money to build pipelines for great distances when Mother Nature has already done the work in creating the pipelines of the rock fissure aquifer?

WHAT PROOF IS THERE OF THE UNIVERSAL EXISTENCE OF ROCK FISSURE AQUIFERS?

The proof of the universal existence of rock fissure aquifers lies in the natural occurrences, the accidental occurrences, and the deliberate scientific interception of these pure, fresh waters.

Natural springs occur in many areas of the world. From many of these springs more water issues than could possibly be accounted for by the precipitation rate of the area. We have some very large natural springs in the United States. For instance, one in Missouri flows 800 million gallons daily, others in the upper reaches of the Metolius River in Oregon flow more than 690 million gallons per day, and springs along a 50-mile stretch of Snake River, Idaho, flow more than 3½ billion gallons daily.

For thousands of years natural springs have been universally accepted as a permanent supply of pure water for communities and cities all over the world. Yet the deliberate manmade creation of springs from their rock fissure aquifers is only now beginning to gain acceptance.

Accidental occurrences in mines have been mentioned. But other construction jobs have also had their water problems. The driving of the Tecolote Tunnel in California near Santa Barbara encountered flows of 9,000 gallons per minute, some of it exceedingly pure and cool and some of it extremely hot and highly mineralized. Just across the continent, in the city of New York, an excavation of little more than 12 feet below the first floor of the adjacent Harlem Hospital Building, water was encountered on February 14, 1956, which was pumped out at a rate exceeding 2,200 gallons per minute. Contractor's representatives, city officials, and consulting engineers retained by both, tried to find the source of the water. Tests, conducted by the city department of water, gas, and electricity, proved that this water was not from the regular city supply sources for the area. Uranine, a green dye, was poured into the adjacent sewers, but none appeared in the water being pumped out. Finally, when hospital chemists certified that the water was fresh, completely free of sewage and in fact fit for human consumption, it ruled out the nearby Harlem River as the source of these waters. More than 1¼ billion gallons of water were pumped during the 13-month period. The pumps kept working until 12 stories of structural steel were erected and several floors had been decked with concrete slabs. Only at that point did engineers decide there was enough weight to hold the foundation down against the hydrostatic pressure.

Yet, in most of the accidental occurrences of such springs, has there been the continuous attempt to put this new water to use. It was regarded as a mere nuisance, and this basic natural resource was allowed to go to waste, simply because the thinking of our engineers and practical men has not yet been adjusted to the new concept of hard rock fissure aquifers as a reliable source of water supply.

But it is precisely on the basis of this concept that I have successfully located rock fissure aquifers in many parts of southern California and other Western States.

More and more in recent years my work has been checked and confirmed by others. O. R. Angelillo, an exceedingly talented and versatile engineer, after painstaking research in the field for more than 6 months concluded that more than a million acre-feet of water was available in the fissures I had previously contacted in the Mojave Desert. Eminent scientists like Dr. Arnold, Dr. Pierce, and Dr. Richter have issued reports on or otherwise endorsed my work.

One of my wells is now being completed through solid granite near Eilat in the Negev Desert area of Israel. At a depth of little more than seven hundred feet a nine-foot fissure was encountered, and the water came up the well hole to within 150 feet of the surface, producing water of exceptionally high quality. The Government of Israel has sent several of its officials here with instructions to purchase equipment on our recommendation. They have placed orders for 84 items of drilling and pumping equipment of American manufacturer for the purpose of obtaining large volume production from this and other wells located by me in hard rock.

I have also drilled rock fissure wells in Mexico, on behalf of the Federal Government, in the States of Puebla, Oaxaca, and Baja California, which have been in production for more than 10 years.

Within the past year at the invitation of the Egyptian Government, I discussed in Cario and on field trips with representatives of the Ministry of Interior, the Department of Geology and the Desert Institute, a program of water development along the principles which I have outlined here, with the result that I

have promised in the very near future to return for the purpose of locating a considerable number of wells in desert areas.

While in Egypt I was approached by the official representatives of the Governments of Iraq, Kuwait, Saudi Arabia, and Lebanon, and invited to work in their countries to locate wells and teach my methods and concepts. However, the only invitation which I had the time to accept was from the Prime Minister of Sudan, Sayed Abdullah Mahdi, and flew over and made ground observations over a large area of that huge country. I have agreed to return there also and have a representative in Khartoum at this time who is working out the details of a water exploration and development program.

IS IT ECONOMICALLY FEASIBLE?

Although the hydrostatic pressure of the waters flowing through rock fissure aquifers is not often sufficient to make the wells flow, it does in almost every instance force the water up to levels that make pumping costs entirely economically feasible. Gentlemen, it is certainly far more economical to pump water vertically up 300 feet than to pump it and transport it laterally for 450 miles.

IS IT POTABLE?

Hot and highly mineralized waters exist, but such waters are different from the fresh, pure, potable water that is found in the rock fissure aquifers that I intercept. J. E. Spurr, an eminent mining geologist, has succinctly pointed out that he has traversed and studied exhaustively and mapped carefully many thousands of mine workings, during a period of many years. These mine workings have been at all depths, frequently thousands of feet below the surface and at all depths he has noticed openings in rocks, especially along fault or fracture zones, and found waters circulating vigorously along them. These waters were cold, lukewarm, and only rarely hot.

IS IT PERMANENT?

Water that migrates in rock fissure aquifiers will always be available for the supply is of perpetual duration. As long as the earth is active, these waters will be available. The activity of the earth is amply illustrated by earthquakes and volcanic eruptions. William Rubey, an eminent geologist of no mean stature, having been president of the Geological Society of America and also Chairman of the U.S. National Research Council, has concluded that all the water on the earth has come from the interior of the earth throughout geological time and the process still continues today.

SOUTHERN CALIFORNIA

It is only natural that I should have done quite a bit of my work in southern California. My residence is here and here too, there has been a great need for my services. In addition to the rock fissure aquifers that I located in the Mojave Desert, I have successfully found water at the Pacific Palisades which is within the city limits of Los Angeles. I have repeated this at Three Rivers; at Lakeside, San Diego County; at Escondido, San Diego County; at Indio, Riverside County; at Anza, Riverside County; and more than 10 wells in Ventura County. Many of these wells have produced large volumes of water for more than 10 years but our State water resources department has never included these in any water availability surveys. However, several small volume wells that were only partially completed due to the lack of sufficient funds on the part of the owners have been repeatedly referred to as typical Riess wells.

In contrast, the cities of Cottonwood and Craigmont in the State of Idaho have for more than 10 years been unsuccessful in their drilling attempts to obtain adequate water supplies. Unsuccessful locations had been made by university, governmental, private, and military cousultants. Today these communities have surplus high-class water drilled in solid rock located by me right in the heart of these cities. These pure water producing wells were located on the first attempt. The U.S. Air Force installation is now purchasing water from the city of Cottonwood, from the surplus supplies made available by my location of a second successful well at Cottonwood. The above wells and many others are a matter of record which our State water resources department is aware of but refuses to acknowledge that private initiative can contribute to the solution of our water problems.

The development of water from rock fissure aquifers has been entirely by private risk capital. Such water supplies constitute a decentralized solution that can be applied simultaneously in the many areas that need it most, and furthermore, such water supplies are free from the risks of radioactive or bacteriological contamination, a vital consideration in its own rights.

WHAT PROGRAM IS ADVOCATED?

The only program we advocate is one of American self-help based on free enterprise, individual initiative and private risk capital. Only in this manner can we provide the needed water without resorting to public deficit financing of the most tremendous proportions.

CONCLUSION

In conclusion, Gentlemen, I trust that you completely understand that the above presentation has been only a mere summary of the subject. I only request that you challenge me to further document this concept and all of the statements which I have made to you.

I will be happy to make myself available to your committee at any time in any time in any place for questioning on the subject of rock fissure aquifers.

Senator ENGLE. Is Mr. Howard Crooke here, of Orange County? Anyone who desires to file his statement with the committee without reading it or formally presenting it may do so and the statement will appear fully in the record.

Mr. Crooke, you are a supervisor of Orange County?

STATEMENT OF HOWARD CROOKE, ADVISER, ORANGE COUNTY BOARD OF SUPERVISORS; SECRETARY, ORANGE COUNTY WATER DISTRICT

Mr. CROOKE. No; I am not a supervisor from Orange County. I will explain my position here.

Mr. Chairman and members of the Senate Select Committee on Water Resources, my name is Howard W. Crooke.

On October 13, 1959, I was designated by the Orange County Board of Supervisors, which I serve as adviser on water matters, as their representative to appear at this hearing to present their views on Federal water policy.

On October 14, I was authorized by the board of directors of Orange County Water District, which I serve as secretary-manager, to present to you here today their views on the same subject.

These two governing bodies have achieved a high degree of cooperation and integration in their activities pertaining to water supply and flood control. With this in mind it can be readily understood that their views may be expressed concurrently.

Due to the limited time available to me to prepare for this presentation, I must of necessity ask your permission to speak from notes. I assure you, however—and again with your permission—that I will submit to you adequate copies of my presentation within the next 3 weeks.

In order that you may more fully understand our attitude on Federal water policy, I would like to acquaint you with some of our local problems pertaining to water supply and what we are doing about them at the local level.

In 1933, at the request of the people of Orange County, the California Legislature created the Orange County Water District. One

of the fundamental purposes of the district is to maintain the integrity of the water supplies of the ground water basin which underlies the major portion of the area of the district. In other words, the district is charged with the responsibility of maintaining adequate supplies of ground water for the landowners and inhabitants of the district and to protect these ground water supplies from contamination or pollution.

Our water district has an area of approximately 300 square miles, and an assessed valuation in excess of three-quarters of a billion dollars which is approximately 70 percent of the total assessed valuation of Orange County.

Our average annual available supply of local water has been estimated at 153,500 acre-feet.

Our estimated total water requirements for Orange County for the years indicated below are as follows:

	Estimated total water requirements expressed in acre-feet	Agricultural requirement		Domestic-municipal-industrial requirement	
		Acre-feet	Percent of total	Acre-feet	Percent of total
1957	243,700	163,900	67.0	79,800	33.0
1979	409,300	65,280	16.0	344,020	84.0
1999	543,500	23,360	4.3	520,140	95.7
Ultimate	825,000				

It can readily be seen from these estimates that our requirements for imported water for 1957 were 90,200 acre-feet; by 1979 they will reach approximately 260,000 acre-feet; and by 1999, approximately 400,000 acre-feet.

The above figures have been determined from population estimates for Orange County which are as follows:

Year:	*Population*
1950 (actual)	216,000
1960 (estimated)	692,000
1970 (estimated)	1,320,000
1980 (estimated)	1,900,000
1990 (estimated)	2,320,000
2000 (estimated)	2,620,000

In 1953 the California Legislature adopted amendments to our Orange County Water District Act which provide for the levy and collection of replenishment assessments on the production of ground water. The replenishment assessment (locally referred to as a "pump tax") is levied each year in June and pertains to all ground water produced during the ensuing fiscal year, July 1 to the following June 30. The current rate is $4.30 per acre-foot of ground water produced from water-producing facilities within the district.

The 1953 amendments also contained a requirement that operators of water-producing facilities within the Orange County Water District affix to the pump discharge of each well a water measuring device capable of registering the accumulative amount of water produced. This requirement applies to all wells with the exception of those having a discharge opening two inches or less in diameter and producing water for irrigation and domestic purposes on an area not exceeding 1 acre.

The funds collected from the pump tax are placed in a special account and can be used only for the purchase of imported water for ground water replenishment.

An ad valorem tax is also levied on all real property within the district. This tax cannot exceed 8 cents per $100 assessed valuation. It provides funds for the operation of the district, including the acquisition of spreading grounds and additional purchases of imported water.

The entire area of our district is within the service area of the Metropolitan Water District of Southern California. In fact, that portion of Orange Couny which contains in excess of 99.2 percent of the total assessed tangible values of our county is a part of MWD.

Our first importation of water for ground water replenishment was in August 1949. To date we have received and spread for ground water replenishment in excess of 530,000 acre-feet of Colorado River water from the facilities of MWD. Last month (September 1959) we received and spread in excess of 20,000 acre-feet for which we paid more than $240,000 to cover maintenance and operation of the aqueduct system.

Ground water levels throughout the area of our district dropped from an average of 23.6 feet above sea level in 1944 to an average of 21 feet below sea level in 1956. During the next 2 years following 1956, our ground water replenishment program was operating on a large enough scale not only to replace the annual overdrafts on the district basin but also to raise average ground water levels approximately 10½ feet.

Orange County Water District owns and operates approximately 800 acres of spreading grounds. The latest addition of 64 acres to these spreading grounds cost $4,150 per acre, and is currently being excavated to a depth of 30 feet in order to provide for greater rate of percolation.

A recent survey in our area reveals that the average cost of producing ground water for agricultural use is $9.30 per acre-foot. When the replenishment assessment of $4.30 (current rate) is added, the average cost is increased to $13.60 per acre-foot. It is indicated that the cost of producing water for urban uses is approximately the same, even though most of the water produced must be placed in distribution systems under pressure. This is due to more constant production and the resulting much larger volume in production per unit. As the cost of water increases, it appears that a definite trend develops to use water to the optimum rather than to the maximum.

Located in Orange County, and outside the boundaries of Orange County Water District, are large areas of heretofore unwatered lands. Plans are now developing for the utilization of much of these lands for urban use. Practically all of these lands have been annexed or are in the process of being annexed to MWD. Much or probably all of these lands are so located that, with adequate water supply available, they will have great potentials to offer for homesites as well as industry and commerce.

I believe the brief description I have given you of the activities of our district, all of which have been provided for at the local level, will assist you to understand why we urge the adopiton of Federal water policy which will provide for the maximum utilization of all federally

owned and operated flood control facilities located in our area and for all possible water conservation which can be achieved in conformity with sound flood control regulations.

We have been most gratified to have the Corps of Engineers construct and operate the several flood control dams which have been built to regulate flood flows in the streams of our area and for the additional structure now under construction. These structures have been operated to serve us well. However, in areas such as ours where population is increasing at a phenomenal rate and where local water supplies are no longer adequate, it would appear that from time to time Federal water policy should be reviewed in order to determine if full and complete integration with changing local conditions is being achieved. We must, in our area, use water to the optimum rather than to the maximum. We must also endeavour to prevent any potable water from flowing to the ocean unless in so doing it is accomplishing a beneficial purpose for the overall well-being of the area.

Thank you for this opportunity of appearing before you.

Senator KUCHEL. Thank you, sir.

Any questions, gentlemen?

Thank you very much for your helpful contribution.

Mr. CROOKE. Thank you.

Senator KUCHEL. Mr. John Bryant, chief engineer of the Riverside County Flood Control and Water Conservation District.

STATEMENT OF JOHN W. BRYANT, CHIEF ENGINEER OF THE RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Mr. BRYANT. Mr. Chairman, my name is John W. Bryant. I am chief engineer of the Riverside County Flood Control and Water Conservation District, Riverside, Calif. It is my pleasure to appear before you today at the request of the chairman of the board of supervisors of the district.

I have been requested by the Board of Supervisors of Riverside County to present the statement which I would like to have filed in the record.

Briefly, in the essence of time here I will point out the main features which we are discussing.

We have confined our remarks to that portion of the water program which pertains to flood control. We are interested in the differences in the various Federal programs relating to flood control, namely, 566 and U.S. Corps of Engineers. Under the Corps of Engineers' program we are requested or required to pay land-enchancement cost resulting from the construction of Federal programs of Federal projects, while under 566 no such payment is required. We also wish to point out there is some overlapping in these two programs and we feel it is in the best interest of all that this overlapping be eliminated and the scope of 566 be more definitely determined.

Another point we would like to bring to your attention is that under one program more consideration is given for future development than under the other.

The other point which we have brought out in our statement is that under the present Federal policy local areas and communities

are penalized in their attempts to construct flood control projects. Now, by this I mean that a project must have a favorable benefit-cost ratio. We in the field are very often forced to proceeding with some type of flood control measures to the limit of our financial capacity. In constructing channels, for example, at a later date if the Corps of Engineers come in with a program the channels constructed on a local basis and financed locally tend to reduce the overall damages that might occur.

In this manner we could feasibly eliminate the justification of a Federal project. So we feel that the Federal Government should take another look at this program and eliminate the features which tend to penalize local areas for proceeding with flood control measures on their own.

That, Mr. Chairman, is the main essence of our statement and I want to thank you on behalf of the Board of Supervisors of Riverside County for having this opportunity to appear before you.

Senator KUCHEL. Thanks very much, Mr. Bryant. You have given us something to think about in discharging our responsibility for making policy recommendations.

Mr. BRYANT. I thank you, gentlemen.

Senator KUCHEL. Any questions?

(The prepared statement referred to follows:)

STATEMENT OF JOHN W. BRYANT, CHIEF ENGINEER, RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Mr. Chairman and members of the committee, my name is John W. Bryant. I am chief engineer of the Riverside County Flood Control and Water Conservation District, Riverside, Calif. It is my pleasure to appear before you today at the request of the chairman of the board of supervisors of the district.

I shall confine my remarks to that phase of the water problem pertaining to flood control and endeavor to point out the problems with which we are faced because of the lack of a uniform policy in this field.

The problem of flood plain zoning is common to all States and yet one that has been handled by the States in many different manners. I do not believe that any two have a law governing flood plain zoning which is alike in all respects. With respect to California, the tremendous growth that is now taking place within the State and which is forecast to take place in the next quarter century, this is a problem that must be faced in a realistic manner in conjunction with the planning for adequate flood control measures.

Under the present flood control program of the U.S. Corps of Engineers, flood control projects are not authorized and constructed unless the projects have a favorable cost-benefit ratio. In most instances very little credit is given to future damages which might accrue by way of future downstream development of the flood plain. This means that where the flood plain is not sufficiently developed for the average annual potential damage to be greater than the average annual cost of protection, we are unable to justify Federal participation in flood control projects. A good example is the Whitewater River watershed located in central Riverside County and draining into the Salton Sea. This is one of the most rapidly growing areas in the United States today. Now is the time, when necessary rights of way can be obtained at a minimum cost, that an adequate flood control program should be initiated and works constructed. However, it is questionable whether or not, based upon the present development, that a federally authorized flood prevention program could be justified. Thus the county is left with three alternatives; (1) to proceed with the flood control program financed on a local basis; (2) to institute a program of flood plain zoning which would eliminate all development from those areas which may have a potential flood threat; or (3) let the areas develop to the point at which a Federal program would be justified.

In the first case, it is impossible for the county or the district to finance a program of this magnitude which it is estimated would cost, for Whitewater watershed alone, upward of $150 million. The second instance, severely re-

stricting development, would be impossible from a political standpoint and certainly not a practical or economical solution to the problem. In the third case, waiting for the development, cost of rights-of-way and relocation of utilities would be much greater and would represent considerably more in terms of total project costs to the Federal, State, and local government.

Possibly a policy could be established combining the No. 1 and No. 3 solutions. For instance, local agencies might proceed with a program of channelization which within itself would not provide the ultimate in flood protection, but would be sufficient to protect the area from lesser flood flows and would tie in with a master plan of future optimum control. With the construction of these channels, development could take place and in the future when the stage of development so warranted the Federal Government could proceed with the major control measures. However, if such a course were to be followed, the channels constructed by the local interests should not be used by the Government in computing average annual damages, and, if constructed in accordance with master plans developed by the Corps of Engineers, the local interests should be reimbursed by the Federal Government when they proceed with construction of the other phases of the plan.

In conclusion, I wish to state that in my opinion the flood control programs of the Federal Government need to be reviewed and where discrepancies exist proper changes made to make them uniform, and procedures adopted which would not penalize local interests in their attempts to provide a reasonable degree of flood protection and which would enable the Federal Government to more fully assign damages to future development that will take place after the completion of the projects.

Senator KUCHEL. Mrs. Richard Glass of the League of Women Voters.

Mrs. Glass, are you here?

We are very happy to welcome you, Mrs. Glass. We had representatives of your excellent organization not only in Sacramento but all across the country. The national leadership conferred with this committee in Washington while we were in session. So it is a commendable thing that your organization does in this field.

STATEMENT OF MRS. RICHARD GLASS, STATE WATER CHAIRMAN, LEAGUE OF WOMEN VOTERS OF CALIFORNIA

Mrs. GLASS. We thank you very much, Senators, for this opportunity to report to you on the trend of league thinking on the water issue.

I am the State water chairman of the League of Women Voters of California.

This means that I represent today some 59 local leagues in California with a membership of over 10,000.

We have been studying water problems in the country for the past 3 years, along with leagues throughout the Nation, as you know.

Our appreciation of the complexity and importance of water-resource development has grown as we have delved more deeply into the subject. We now believe in the importance of regional or river-basin planning and development of water resources; we see the need for coordination among the multitude of Federal agencies and between the Federal, State, and local agencies involved; and we are seeking criteria to establish an equitable system of financing.

The League of Women Voters of California has also been studying the need for a statewide water plan in California. Someone has said that if there is one water policy for the 17 Western States it is the assertion of complete State authority over water with incessant demand for Federal aid. We like to think in California that we are a little

different, that we are breaking away from this pattern. In California we are thinking about the need for a statewide water plan. Our members agree in California on developing our water resources. Local agencies that have met so many of our water supply problems in the past do not have the financial resources to build comprehensive multipurpose water projects. The Federal Government's role has largely been limited to flood control and irrigation. While we welcome and need continued Federal assistance in these areas, we believe the State is the logical regional agency to meet California's mounting demands for water. Since we have a major river basin within our boundaries and sufficient water for our predicted ultimate need, and the financial means to develop our water resource, the league supports a statewide master plan of development.

League members have observed that the recent reorganization of our own State department of water resources, merging functions formerly performed by several State agencies, has strengthened the planning and administrative functions of the department. We in the league are still in the throes of discussing the problems involved in the proposed State water bond issue (senate bill 1106). The league is seeking consensus on the best methods of financing and repayment for the State projects, on whether the State should follow Federal policy in irrigation and power, and what safeguards are needed to protect public and private interests in the State program. To help our members and citizens generally to consider the crucial water issues that face California, the league has prepared this pamphlet "Water Lines" which we have presented to this committee. As soon as our membership has reached conclusions on these water problems, we will express them publicly and take political action on proposed State legislation.

The League of Women Voters of the United States has been greatly encouraged at the formation of your select committee to study water resources. The historic, piecemeal development of our vital water resources no longer suffices for the regional, multipurpose projects of today. The basic weaknesses that the league has observed in the Federal program are these:

(1) Insufficient research for hydrological data. Research is an integral part of intelligent planning. There is need for more funds for basic data, more continuity in research and coordination of the data collected by various agencies. Because of inadequate data, the flow of the Colorado River was overestimated. And we know what trouble and litigation this has led to. There is much jurisdictional rivalry between the Corps of Engineers and Bureau of Reclamation and we see no uniform treatment of beneficiaries for instance, in those projects. There has been much siltation of reservoirs, and sometimes overextension of irrigation systems.

(2) Haphazard legal growth of conflicting Federal policies. There seem to be no uniform principles guiding Congress in authorizing projects, no evidence of overall planning or comprehensive programing of projects.

(3) There is conflict, duplication, and overlapping functions of the some 25 Federal agencies involved in water resource development. We find that this system of administration has not promoted economy or efficiency. It has hindered the cooperation of Federal, State, and

local governments. The interagency rivalry I mentioned before between the Corps of Engineers and Bureau of Reclamation, and the Kings River project is notable for this instance. We see a national resource coordinator or a board of review have been ignored.

(4) There is little effective screening, review or good system of priorities in project timing. It is questionable whether the Bureau of the Budget is the proper agency to do this. A special board of review might furnish a more balanced and comprehensive evaluation of water projects.

(5) We see no consistent policy on costs, repayments, or project evaluation. There seems need for uniformity for these purposes; perhaps the establishment of a standard cost-benefit formula. Hidden subsidies are undesirable. The people should know and approve if power is to repay part of the costs of irrigation, for example.

(6) The many congressional committees dealing with water also make for confusion, at least in the public mind. Consideration of a basin program may be divided among such diverse committees as I gather represent Agriculture, Public Works, Interior and Insular Affairs, Appropriations, and there are also numerous subcommittees. Among the many and extended hearings held on the Central Valley over the past 20 years, no hearing was ever held on a comprehensive plan for the basin as a whole. Perhaps you gentleman will want to consider a joint water resources committee in Congress with overall authority similar to the Joint Atomic Energy Committee. In fact, I understand that Senator Murray has introduced a bill (S. 2549), the Resources and Conservation Act, to set up a Council of Advisors in the White House and a joint committee in Congress to give continued attention to the needs of the Nation in natural resources. The League of Women Voters of the United States plans to support this measure.

The sources of league information in or study may be of interest to you. We have read the reports of the various surveys such as the two Hoover Commission studies, the report of the President's Water Resources Policy Commission of 1950 and that of the Presidential Advisory Commission of 1955. In addition, we have profited from the recently assembled documents on the Central Valley project as well as the standard books and reports on investigations of water and Government. One of the most exciting sources has been attendance at legislative hearings. Moreover, we have had a series of personal interviews on State and Federal water problems with eminent water experts in California, ranging from the administrators in agencies to politicians, to elected officials, to economists, and political scientists. They have all been most helpful in discussing the aspects of water resource development in which we have been interested. From these interviews the impression is that there is good cooperation among the various agencies in the field. It may be that the conflicts between levels of government and among the agencies, mentioned frequently in the reading material, exists in Washington more than it does regionally. I certainly can speak for my own area this week when I saw the magnificent cooperation between the U.S. Forest Service and the local city and county fire departments. This has been most impressive to us. We also found no suggestion of need for new coordinating machinery between the Federal and the State governments. And this attitude prevailed with due consideration of the probable enactment of the San Luis project, which is an unpredecented plan for a joint Federal-State project.

In conclusion may I say that the League of Women Voters thinks there is evident need for some kind of reorganization or coordination of the Federal water agencies. It may not be possible to establish a national policy that will fit all regions or all water problems of the country but more uniformity in procedures for project evaluation and for repayment seems indicated.

The League of Women Voters of California also believes that the State should assume more responsibility in planning and financing water-resource development in California. Our organization will follow the work of this committee with great interest. We hope that your findings and recommendations will establish a framework for resource development that will meet, fairly and efficiently, the expanding needs of our people, including future generations.

Senator KUCHEL. Mrs. Glass, that is an excellent statement. I thank you for it. Your suggestions of the difficulties, what we might call, I guess, the jurisdictional difficulties between at least two of the very able Federal agencies in this field, the Corps of Engineers and the Bureau, certainly had one glaring example to fit that suggestion of yours in our own State of California when two urgently needed flood control projects in the Central Valley, but Canaan and Hidden Valley were the source of a very unfortunate debate and struggle between these two agencies, as to which one should have the jurisdiction to go forward. That has been——

Senator ENGLE. Will the Senator yield?

Senator KUCHEL. Yes.

Senator ENGLE. On the Folsom project they got in such a fight that the President of the United States had to move into it, and he did. He kind of split the difference. That was Harry Truman. He said the Army Engineers built it and the Bureau of Reclamation would operate it. That is the way it was. That is called the Folsom formula. We have had those struggles and we still do.

Senator KUCHEL. My friend is exactly right. What can be done by policy recommendations in this committee ought to be done and you make a very good point of that along with the rest of those suggestions you have made.

Senator Young.

Senator YOUNG. Mrs. Glass, I just glanced through this pamphlet that you gave us and find some very interesting information. I am going to take it along and read it. I would like to read about a paragraph or two into the record.

It is the subtitle "What Price Irrigation"?

State policy for irrigated agriculture needs special scrutiny because to follow the Federal precedent of allowing the irrigator to pay according to his ability may be too expensive for the State's economy. Yet the importance of irrigated agriculture in California makes the decision vital. The major issues are: Should the State subsidize the farmer at all? Should there be an acreage limitation on State-delivered water? Should the State commit the great portion of its future water supply to agriculture?

Then this statement, I think, is very significant:

California leads the Nation in cash income from agriculture, approaching $3 billion in 1958, almost double that from oil and minerals. In recent years agriculture has represented 65 percent of total California income.

I had known for a long while there was a close race between California and Iowa as to which was the greatest agricultural producers

but I had not realized that 65 percent of your total income from California came from the sale of farm commodities.

Mrs. GLASS. So we feel that the welfare of California is certainly very closely related to the national welfare. What happens to our economy will have a large effect on national economy. So we think we have a very close relationship to the Federal relation.

Senator YOUNG. I don't think you are producing many of the surplus crops, either. I don't think the State of California is adding much to the surplus.

Mrs. GLASS. We do have some cotton and rice.

Senator YOUNG. Wheat and rice?

Mrs. GLASS. Our cotton, though, is of high grade and does find an export market, I understand.

Senator YOUNG. That only represents, I think, a very minor part of your agricultural production.

Mrs. GLASS. I think in the main it is the vegetables and fruit.

Senator ENGLE. Mr. Chairman, may I?

Senator KUCHEL. Senator Engle.

Senator ENGLE. I will add one word and that is to compliment you on this excellent statement. I also compliment the League of Women Voters on their activity in this field. I had a long inquiry from them which I answered at great length. I did it because they have followed this matter with so much interest and taken the intelligent approach they have. Their little booklet, by the way, has information in it that will be very valuable for all of us.

Now, Mr. Chairman, I have a speaking engagement at noon. I did not think we were going to run through the noon hour or I would not have done it. I now have to leave and make that speech. I do not want to make it but I promised to make it so I guess I will have to go. I just want the other witnesses to know that I am not running out. I am just keeping an engagement that I made a long time ago.

Senator KUCHEL. Senator, we are going to miss you. Let me say this. The next witness is the distinguished member of the California State Senate who has the honor to represent this county of your partisan persuasion. He will be left now to the tender mercies of two Republicans.

Senator ENGLE. That makes it even worse.

I feel confident that Senator Richard Richards will take very good care of himself.

Senator KUCHEL. Senator Richards.

Thank you very much, Mrs. Glass.

Will you proceed, Senator? We are delighted to have you.

STATEMENT OF HON. RICHARD RICHARDS, STATE SENATOR IN THE STATE OF CALIFORNIA

Mr. RICHARDS. Thank you, Mr. Chairman and members of the committee.

I do not have a prepared statement and I will be very brief.

I appreciate the opportunity to appear. I am glad I got in in time to say "Hello" to Senator Engle just before he left.

Although I assure you there will be nothing controversial in this statement, they are matters of mutual concern I think we share.

First, may I say on behalf of the county that I am privileged to represent, we welcome you. We are very proud of the work you are doing in the holding of these hearings. And we are particularly interested in and appreciative of the work that each of you men have done in the course of the recent sessions, naturally, in endeavoring to bring help to California which we feel we certainly need.

Senator KUCHEL. Thank you very much.

Mr. RICHARDS. In regard to the immediate water problems facing our States, I, among many others, have been actively participating for the past 5 years. We feel that in the course of the last State's session we did get a breakthrough and that solutions have now started to appear on the horizon which we think we have every opportunity of completing and actually constructing the kinds of projects that our areas throughout the State of California require.

I have been given another honor and that is together with one other Senator we are now preparing the ballot argument for senate bill 1106, the bond issue of $1,700 million which will be on the ballot a year from November. That is, of course, but the financing side of the State program. I feel its passage is vital. I think, however, as our link with State activity and Federal activity becomes not only clearer but a link which must be strengthened it should be said that I was, and I am sure the vast number of the people of the State of California who watched the last session, were disappointed as I am sure you gentlemen were, in the termination of at least for the time being of the most commendable efforts in the attempt to pass the Kuchel-Engle bill. I think that California in undertaking the tremendous project that it has now on paper and that we will be endeavoring to finance through this very large bond issue, and also already appropriating a rather large sum of money from the general tax fund which has already been done by the State legislature in the interest of water development, California has proven its willingness to not only carry its own share of the burden in terms of the necessary water services to our people but to go far beyond that which normally would be considered to be the State's share of that burden. We will go as far as we possibly can. We do, however, need Federal assistance. This is the burden of the brief remarks that I wanted to make.

I think that the Kuchel-Engle bill must be passed into law. I was disappointed in its being bottled up in the Rules Committee of the House after you men in the Senate did such a fine job of getting it through on your side. We are worried about the next session and about the opportunity for a bill of that kind. We feel that if we spend $1¾ billion in the efforts to construct that which is now contemplated as the State portion of the program, which does not include some $300 million which would be involved in the building of the San Luis Dam, that we have both a right and a necessity to not add to that burden beyond that which is now contemplated and to obtain in any way that we can reasonably do so the outside Federal help we feel is certainly needed to make it a total integrated program in the interest of all people. To do that we have to pass a bill of the type you have offered and put forth. To do that we must, I think, increase the efforts on the part of those of us at home, including those of us in the State legislature, if there is any way in which we can make our efforts more effective in relationship to the other representatives of Federal Govern-

ment. Your problem is also our problem although it is less directly our problem; if there are any ways in which we can increase our effectiveness, we would like the advice and instructions from you men, from this committee, now and in the future. If there are difficulties that arise from a political or sectional or economic or legal aspect at home which cause trouble in your efforts to get the necessary votes which are needed to pass the Federal bill, we would like frank and open discussion with as many of us as you see fit to contact, if you feel there is any way in which we can make those difficulties lighter, if you feel there is any way we can increase your own effective efforts.

That is, I think, where it stands at the moment as far as the thinking of those of us on the State level are concerned. We will do everything we can do on the State level both to put forth the State program, from beginning and to completion and to put forth the extra efforts which may be available from us in order to encourage further Federal participation.

Senator KUCHEL. Thank you very much, Senator, for a constructive statement.

We do face, as you have suggested, increasing difficulties with each passing session of the Congress in receiving acceptance of our petitions for Federal assistance in solving our water problems. The Federal Government has been very generous and very kind to us but the competitive situation in the Congress increases as time goes by.

Senator Engle and I this year, Senator Knowland and I last year, were able on both those occasions to receive Senate approval on a completely nonpartisan basis of the San Luis Dam legislation, about a $400 million undertaking, and we did have, as you will recall, some difficulty in receiving the acceptance of the Senate of our basic position. We need to start with, as you have suggested, a unanimity of opinion among those who represent us, both in our State government and in our Federal Government.

I frankly have been apprehensive that perhaps some members of our congressional delegation would not look with favor on what we have tried to do. We took a major step forward in January of this year when happily all of the water agencies of our State agreed to sponsor and to approve this piece of legislation. To the extent that men in the legislature like yourself can help demonstrate the need for maximum cooperation by the Federal Government as indicated in this San Luis legislation, you will, no doubt about it, be discharging a high service to all our people. I hope very much that all members of our congressional delegation will be able to support that bill.

Senator, any questions?

Senator YOUNG. No, thank you.

Senator KUCHEL. Thank you very much for coming.

Mr. RICHARDS. Thank you, Senators.

Senator KUCHEL. Mr. Rex B. Goodcell, this time representing the Feather River Project Association, will now present a statement.

STATEMENT OF REX B. GOODCELL, REPRESENTING THE FEATHER RIVER PROJECT ASSOCIATION

Mr. GOODCELL. My name is Rex B. Goodcell, Jr. I am an assistant city attorney of Los Angeles and an officer of the statewide Feather

River Project Association, an organization dedicated to water development in California. I am pleased to appear before your committee in behalf of that association.

Briefly, the Feather River Project Association, by resolution adopted in January 1958, advocated that the State assume a continuing responsibility for the development of the water resources of the State in cooperation with the Federal Government and that in such development the State maintain a sufficient, regulated quantity of water in the delta pool to supply all of the State's water export contract requirements under the California water plan, at a uniform rate, adjustable periodically, sufficient to pay to the State the reimbursable costs for such water development and delivery.

These principles are those of the delta pool utility concept adopted by the legislature in enacting senate bill 1106 authorizing the financing for the State water development and by executive and administrative declarations of policy for such development.

Mr. Harvey O. Banks and others representing the State of California have fully informed this committee of the proposed $2 billion multipurpose State water project which has the full support of the Feather River Project Association. Accordingly this statement is limited to the urgent need for the development of the water resources of this State by the Federal Government, the State and local agencies, each cooperating with, and assisting the other, to get the job done.

The present and future economy of California is dependent on water development—time is critical. Many areas need the water now. There is both a Federal and State interest in the economy of California. The magnitude and importance of this water development will require statesmanship and coordinated efforts of government—local, State, and national.

In 1940 the population of California was 6,900,000, and by 1950 it had increased to 10,600,000. Today the estimated population of California is more than 14 million. Planners are talking in terms of 20 million in less than a decade, and nearly 40 million by the turn of the century.

In 1950 the estimated seasonal shortage of developed water in the State was about 2,700,000 acre-feet, largely represented by an overdraft on ground-water storage. By 1955, water requirements had increased by about 3 million acre-feet per season. Allowing for the new water developments during that 5-year period, the overdraft deficit has increased to over 5 million acre-feet per year. Ground basins are being depleted. Salt-water intrusion in the coastal-area basins is a serious problem. The present economy is based on the use of historical ground-water basin reserves. Obviously the economy of California cannot be maintained on such deficit use of water reserves.

It is highly significant to note that although the project will require over 10 years to complete, every drop of water it will yield is needed today. Yield of the Feather River project only equals the present deficit in California. It is obvious that large as this State Feather River project is, additional projects, under the California water plan must be begun before the project is completed.

State water development is further emphasized by the fact that authorized Federal projects, some of which are under construction in the State, will require for completion an expenditure in excess

of $700 million. These projects do not include the proposed Federal San Luis project so vital to the State's water program. At the average rate of appropriations by Congress (less than $100 million annually) the completion of these authorized Federal projects will take over 7 years.

The California Water Bond Act will provide sufficient money (when coupled with other available funds) to assure completion of the State project for which construction requirements range from $100 million to $200 million per year.

Water agencies in California will meet their respective responsibilities in water development. With the cooperation of the Federal Government needed water development will be accomplished.

It is a matter of historical record that local agencies—both public and private—in California have financed the costs of their water and power developments. These include domestic and industrial water supply and irrigation projects. Because of the magnitude of water development in recent years, the trend has been for local agencies and communities to band together and form larger districts to cope with the larger projects needed today. Now the State must assume responsibility for general development of our unused waters.

On the national level, the U.S. Government has been in the water business since the early history of the Nation. The Federal activity generally has been confined to flood control, irrigation, navigation, wildlife, and recreation. There has been only a limited participation by Federal agencies in industrial and domestic water-supply projects.

In considering financing of California State projects, we should keep in mind two possibilities for Federal financial assistance. One is the recommendation of the Advisory Committee appointed by President Eisenhower which stated:

> The Federal Government should encourage non-Federal initiation and assumption of responsibility for construction of water-resources projects. This encouragement should include payment in the case of non-Federal projects of the amount that would have been nonreimbursable had the project been federally constructed, and the making or guaranteeing of loans to non-Federal interests for the construction of projects, and other appropriate means.

A second important development along the same line is the bill—S. 13—introduced by Senators Thomas Kuchel and Clair Engle, which would have the effect of implementing the policy recomemnded by the President's Advisory Committee. Briefly, this bill would enable the Federal Government to contribute for local water development primarily for municipal and industrial water supply on a nonreimbursable basis, the costs allocated to flood control, navigation, and fish and wildlife, and to provide interest-free loans for the portion of such projects allocated to irrigation, subject to the provisions of reclamation law and loans with interest for excess lands.

I believe it is significant that these two national approaches to the problem represent a bipartisan policy that could and should be fully supported. Senators Kuchel and Engle are to be commended for their foresight and leadership in offering to Congress S. 13, a bill which provides a policy that will stimulate and make possible local water development without additional cost to the Federal Government. The adoption of this bill will provide uniformity for Federal-State cooperation in water development. Such uniformity is vitally necessary for such development.

In June 1958 the Feather River Project Association adopted a resolution requesting Congress—

> to provide financial aid for the State of California's Feather River project to the same extent that such aid would be provided to the project under Bureau of Reclamation laws were it constructed by the Federal Government, including payment of the amount of the nonreimbursable items of project expenditures for flood control and irrigation.

Such assistance by the Federal Government would provide a real stimulus for this and other States developing their water resources.

The subject confronting this committee is of the greatest importance. The policies adopted and which are to be adopted for this development will set the pattern for development of other units of the California water plan and those of the Western States. This unit will be the first major multiple-purpose water project constructed by any State. The financial policies guiding this undertaking give considered recognition to the historic practices followed by local agencies and by the Federal Government.

The State of California, through its official representatives, based on national water policy and on the practices of the various local water agencies, adopted senate bill 1106, authorizing the financing for State water development, which together with declared administrative policy provides a sound basis for State water development on a utility basis—those who receive the benefits pay the costs. Such a policy makes provision for continuing financial support and participation by the Federal Government and by local agencies within their respective historic spheres of activity.

Basically these policies start with the belief that the State of California must and should assume overall responsibility for financing State water development with the aid and cooperation of the Federal Government.

Federal funds for flood control, fish and wildlife protection, recreational features of nationwide interest, navigation, and similar items under established Federal policy, should be made available on a nonreimbursable basis. Federal funds, if provided for irrigation, should be reimbursable in accordance with prevailing Federal policies.

The relationships of water rights between the Federal Government and the State have been put in serious question by recent decisions of our Federal courts. Water rights should be subject to and governed by State laws. H.R. 4567 and S. 851 have been introduced in Congress to settle this question and should be adopted.

The Feather River Project Association supports State control and development of water resources.

We heartily concur with Senator Kuchel's statement quoted in yesterday's press:

> Our rapid population increase and headlong urbanization make the maximal beneficial utilization of our Nation's water resources more urgent almost by the hour.

California is certainly in this category.

California has, after years of exhaustive study and legislative effort, made preparation to meet its water problems. With the cooperation of the Federal Government this will be accomplished on time.

We commend your committee for its farsighted studies and offer our utmost cooperation.

(Brief recess.)

Senator KUCHEL. The committee will come to order.

Is Mr. Max Bookman, of the Southern California Water Coordinating Conference, here now and available to testify?

STATEMENT OF MAX BOOKMAN, MEMBER OF EXECUTIVE COMMITTEE OF THE SOUTHERN CALIFORNIA WATER COORDINATING CONFERENCE

Mr. BOOKMAN. Senator Kuchel, my name is Max Bookman. I am a consulting engineer in the field of water supply, serving a number of communities and water agencies here in southern California. Also, I am a member of the Executive Committee of the Southern California Water Coordinating Conference in whose behalf I am appearing and have particapted in its work from the very beginning, more than 3 years ago. This conference includes representatives from some 40 organizations engaged in water production and distribution or having a community interest in water supply. These organizations are located in southern California within the counties of Santa Barbara, Los Angeles, Orange, Riverside, San Bernardino, and San Diego.

The conference was organized in May of 1956 and has been actively and continuously engaged in efforts to further water-development programs necessary in southern California and throughout the State. In 1957 it printed and distributed widely throughout the State the carefully developed and phrased "Statement of Principles for Statewide Water Development" in an effort to assist in the establishment of sound policy and proper legislation. The continuing objective of our conference has been to formulate recommendations on matters of water policy, evaluate the time and need for water-development projects, press for the solution of water-rights problems, and urge the adoption of policies in regard to financing water-development projects.

In carrying out the objectives of the conference, the group has gathered considerable information in regard to the nature of southern California's water problems. Accordingly, upon receipt of your committee's notice of your desire to secure information on specific problems in the water-resources field, the executive committee, believing that it might be helpful to you to have the opinions of the conference group, requested at our meeting held on September 30, 1959, that this statement be filed, and would like to take this opportunity to express their opinions on a number of problems which exist in the southern part of the State.

Mr. Chairman, I will not read this statement in its entirety but I would ask that it be included in the record.

Senator KUCHEL. It will be.

(The prepared statement referred to follows:)

STATEMENT OF MAX BOOKMAN, SOUTHERN CALIFORNIA WATER COORDINATING CONFERENCE

Mr. Chairman and members of the Select Committee on National Water Resources, my name is Max Bookman. I am a consulting engineer in the field of water supply serving a number of communities and water agencies in southern California. Also, I am a member of the Executive Committee of the Southern California Water Coordinating Conference in whose behalf I am appearing and have participated in its work from the very beginning, more than 3 years ago.

This conference includes representatives from some 40 organizations engaged in water production and distribution or having a community interest in water supply. These organizations are located in southern California within the counties of Santa Barbara, Los Angeles, Orange, Riverside, San Bernardino, and San Diego.

The conference was organized in May of 1956 and has been actively and continuously engaged in efforts to further water-development programs necessary in southern California and throughout the State. In 1957 it printed and distributed widely throughout the State the carefully developed and phrased "Statement of Principles for Statewide Water Development" in an effort to assist in the establishment of sound policy and proper legislation. The continuing objective of our conference has been to formulate recommendations on matters of water policy, evaluate the time and need for water-development projects, press for the solution of water-rights problems and urge the adoption of policies in regard to financing water-development projects.

In carrying out the objectives of the conference, the group has gathered considerable information in regard to the nature of southern California's water problems. Accordingly, upon receipt of your committee's notice of your desire to secure information on specific problems in the water-resources field, the executive committee, believing that it might be helpful to you to have the opinions of the conference group, requested at our meeting held on September 30, 1959, that this statement be filed.

From the announcement of your meeting it is understood that you will receive detailed facts from State and local water agencies as well as Federal agencies concerned with our area. We will, therefore, limit our presentation to our general views on the water-resources needs and problems which we face in southern California.

The phenomenal development which is taking place in southern California has been, and will continue to be, largely dependent upon the availability of adequate water supplies. The Southern California Water Coordinating Conference would like to present its views in connection with problems of water supply, flood control, watershed protection, and sewage disposal.

WATER SUPPLIES

Water needs.—Southern California, predominantly through its own efforts, has made outstanding accomplishments in providing water for the landowners and inhabitants of the area. These developments have included extensive utilization of the surface- and ground-water supplies within the area and the construction of two outstanding water-engineering projects, the Los Angeles City 240-mile aqueduct and the Metropolitan Water District of Southern California 300-mile Colorado River aqueduct.

In coastal southern California alone from Ventura County to San Diego the present water requirements are estimated to be about 2,300,000 acre-feet annually. To meet these water requirements there are available water supplies from local sources equal to about 1 million acre-feet a year, some 320,000 acre-feet annually through the Los Angeles City aqueduct, and rights in and to the Colorado River equal to 1,212,000 acre-feet, or a total supply of about 2½ million acre-feet. The Los Angeles City aqueduct has been used to capacity for the last 15 years and the local supplies are overdrawn in many of the ground-water basins in southern California. The estimated overdraft of these basins amounts to about 300,000 acre-feet a year. As a result, ground-water levels are dropping in most of the areas and have been lowered to elevations far below sea level, in some locations as much as 100 feet below sea level. Because ground-water elevations are now so far below sea level, ocean water is moving inland along the coast of southern California, seriously damaging the ground-water basins.

During the last fiscal year the Colorado River aqueduct delivered more than 600,000 acre-feet to the coastal portion of southern California. The Metropolitan Water District of Southern California has underway a construction program to complete the aqueduct system and its distribution facilities. This additional construction, which will cost well over $200 million, is expected to be completed by 1960 at which time the aqueduct will be capable of delivering its full capacity of 1,600 cubic feet per second. The delivery of Colorado River water through the aqueduct system has been increasing at a rapid rate. In 1950–51 the district sold 167,000 acre-feet of water to its member agencies. As heretofore stated, during the last fiscal year, the sales of Colorado River water

by the district had increased to about 600,000 acre-feet. This represents an average annual increase of over 50,000 acre-feet of water. It is estimated and generally concurred in that the aqueduct may be used to its full capacity within the next 11 years, or on or about 1970.

The best estimates which we can furnish your committee in regard to the growth of population and the need for water supplies are those which have been prepared by the State department of water resources. Their detailed, comprehensive studies indicate that at the present time there are about 8,800,000 people in southern California, close to 60 percent of the State's total population. Forecasts of population growth indicate that we may expect the population in southern California to double by 1980. By the year 2000 it is estimated that the population in southern California will total about 23 million people, almost twice the present population of California.

The present water requirement in the coastal areas of southern California from Ventura County to San Diego County as heretofore mentioned, amounts to 2,300,000 acre-feet annually. About 1½ million acre-feet of this total is used to meet urban water requirements and the balance is put to agricultural use. There has been, during the last number of years, a continuing decrease in agricultural water requirements in this area and a corresponding and even greater increase in urban water requirements. Additional heretofore unwatered land is also being put both to agricultural use and to urban use, and will continue to be.

It is the conference's opinion that within the metropolitan areas agriculture will eventually be entirely replaced with urban development. The State department of water resources' studies indicate that the urban water requirements in this area will increase in 1980 to 2,965,000 acre-feet, almost double the present amount, and by the year 2000 the urban requirements will increase to 4,327,000 acre-feet a year. The need for additional water supplies to southern California over and above the 2½ million acre-feet presently available and described above, will amount to about 1 million acre-feet annually in 1980, and will be about 2½ million acre-feet annually in the year 2000.

The Southern California Water Coordinating Conference believes and urges that these water needs can best be supplied through the adopted, comprehensive California water plan. We are looking toward the accomplishment of the State's presently proposed water-development project which provides for the transportation of water from the North to the South as the most feasible means for assuring delivery of the necessary water to southern California. We are also hoping that research on the possibility of economic and practical demineralization of sea water and brackish water will be successful someday and provide an additional source of potable water.

No doubt the State has presented testimony which includes the many details of the California water plan. We wish to point out, however, that the State's water plan includes participation of the Federal Government such as in the flood control features to be incorporated in the Oroville Dam and Reservoir and the possible joint facilities that must be undertaken in connection with the San Luis unit of the Central Valley project by the Bureau of Reclamation.

We also urge that there be a close relationship in planning by the State and Federal agencies. Federal water policy should be developed by the Congress to require integration of all Federal agencies to produce a comprehensive and coordinated development of water resources, rather than to care singly for each function on a project-by-project basis, as in the past. Such integration should provide for a single standard of economic evaluation of the factors to be used by all Federal agencies on all projects. This is essential if the Federal interests are to be integrated properly with the State's comprehensive plan.

Water rights.—The Southern California Water Coordinating Conference wishes to bring to your attention the necessity for congressional legislation to provide for recognition of State water laws. Recently the Supreme Court of the United States has laid down the rule that, in certain instances, Federal agencies may not be required to follow State water law in the development of water projects. We are referring to the concept of the paramount right of the Federal Government which was established as law in the Pelton Dam and other recent decisions. We urge that the Congress of the United States promptly adopt necessary legislation similar to the principles included in H.R. 4567 and S. 851 which will immediately reaffirm the validity of State water law and require the compliance with it by our Federal agencies. We believe that until this action is taken by the Congress, these recent decisions will cast a cloud over many water rights and may even endanger the proper financing and utilization of

California's water projects. Our people cannot afford to make large, long-term money commitments for projects which, because of this infirmity may never be able to deliver the water for which they were built. Again, may we say, we believe that action on this problem is of utmost importance.

Financial problems.—The Southern California Water Coordinating Conference is concerned about the timing of Federal appropriations needed to finance those portions of the State's water project which are a Federal responsibility. These appropriations need to be made early enough so that construction can proceed without delay. We also favor in principle such legislation as proposed in S. 13 authored by California Senators Thomas Kuchel and Clair Engle. As we understand this bill, it would enable the United States to cooperate financially with State and local public agencies in the development of multipurpose water projects where the major purpose of the project is to provide for municipal and industrial water. Under S. 13 the United States could make available to States or local public agencies undertaking such water-development projects the same amount of funds representing the Federal responsibility as would be invested or loaned if the multipurpose water project were to be built by an agency of the United States. We believe that with the State undertaking the comprehensive development of the water resources, that the coordination with Federal agencies could best be accomplished through the legislation proposed in S. 13. We, therefore, urge your favorable consideration of the principles of this bill.

In connecion with the major water-development projects mentioned above, there may be areas which will require financial assistance for construction of distribution systems or loans for construction of domestic water systems, and so forth. In this connection, we believe the existing programs of the Federal Government may be very helpful in aiding such cases.

FLOOD CONTROL

Southern California has serious flood problems. The topography of the area is such that steep mountain ranges lie immediately adjacent to heavily populated areas. Major floods caused by heavy winter rains and snowmelt carry large quantities of debris from these mountain ranges into the heavily populated areas. These floodflows recurrently have caused loss of life and property damage amounting to millions of dollars. Downstream flood-control works such as debris basins, reservoirs, large retarding basins, and channel improvements have been constructed by the Corps of Engineers and the Department of Agriculture and by local agencies. Over $500 million have been expended for these works. Local agency expenditures amount to over 50 percent of this cost. Recently the people of Los Angeles County approved a $225 million bond issue to supplement a previous bond issue of $179 million, passed only about 7 years ago, for construction of necessary storm drains. It is estimated that the Federal flood control program in southern California is less than 60 percent complete. In view of the phenomenal growth in population mentioned above, it is apparent that the normal rate of construction applicable to other portions of the United States is inadequate to keep pace with the need for flood protection needed here in southern California. We, therefore, urge that the Congress provide a Federal flood control program in southern California which will keep pace with its part in meeting the rapidly growing needs.

Historically here in southern California many of the Federal flood control projects have been constructed and operated primarily for flood control. The increasing need for better management of ground-water supplies requires that the operation of the flood control works be coordinated with replenishment and other conservation programs. We, therefore, suggest that such possibilities be studied and evaluated so that greater benefits may be realized from multipurpose operation of these Federal investments.

In southern California, an area where water should be put to optimum use, there still remain a few projects which could salvage floodwaters now unnecessarily wasting to the ocean. In view of the extremely erratic nature of our weather in southern California, wherein we experience long periods of drought, such conservation reservoirs will require large carryover storage. These reservoirs would require such large capacities for conservation purposes that they may not be filled for intervals of as much as 18 years. Under such conditions the large amount of vacant storage within these reservoirs would provide direct flood control benefits. Consideration should be given to the Federal responsibility for financing the flood control features of these multipurpose projects.

WATERSHED PROTECTION

Repeated experiences have shown that the destruction of the vegetation on the mountain watersheds by fire causes great increases in surface runoff and erosion, thereby adding to the magnitude of our floods and the damages done by them. We, therefore, believe it most important to protect our local watersheds to insure favorable conditions of waterflows. As the population in southern California has grown, the number of forest fires has increased. There is an urgent need for more intensive all-year-round fire protection of our watersheds. These watersheds in southern California include over 3 million acres of public lands. We urge the Congress to provide sufficient funds to the U.S. Forest Service so that the fire-protection and fire-control facilities needed in this area can be provided. Furthermore, our conference believes that watershed research is important to improve the water yields from the mountain areas and to provide better methods for combating forest fires. We, therefore, believe that these research programs should be carried out as rapidly as possible.

SEWAGE DISPOSAL

A problem which accompanies the tremendous urban growth in southern California is the need for more new sewage-disposal systems. This rapid growth presents a financial problem in some new communities which may not be in a position to raise funds to provide the necessary sewage-disposal facilities. We are, therefore, in accord with your existing program being administered by the Public Health Service for assistance, when needed, in financing the construction of such sewage facilities.

In conclusion, may be say that we have brought to your attention only the most important water-resources problems as we see them in our area. These problems seem vital to us and we would be pleased to attempt to furnish any assistance we can to your committee which may tend to further their solution.

Thank you very much for the privilege of expressing our views at this hearing.

Mr. BOOKMAN. And I will highlight the important point which this committee wishes to bring to your attention.

The statement of the committee is primarily concerned with water supplies for the area, flood control problems, watershed protection, and sewerage disposal.

First, in accordance with your notice of this hearing the committee set forth the amount of water needs for southern California.

I will not go into the figures, which have already been presented in many instances at this hearing, but you will find them in our statement here.

It is significant to note that the committee believes the population growth indicates we may expect the population of southern California to double by 1980 and by the year 2000 we estimate the population in southern California will include some 23 million people, or twice the present population of California. Accordingly, we call to your attention in the statement the need for additional water requirements and point out we are looking forward to the participation in the State's water program and the importation of water from the northern part of the State to the southern part.

We point out the amount of water that we believe southern California will require under this plan.

After giving you information with regard to our water needs in southern California, we urge there be a closer relationship in planning between State and Federal agencies. The Federal water policy should be developed by Congress to require integration of all Federal agencies and to produce a comprehensive coordinated development of our water resource. Our conference believes this is important because the Federal water program must be closely coordinated and integrated with the State comprehensive plan.

A most important problem which we urge your committee to give attention to is this matter of water rights.

The Southern California Water Coordinating Conference wishes to bring to your attention the necessity for congressional legislation to provide for recognition of State water laws. Recently the Supreme Court of the United States had laid down the rule that in certain instances, Federal agencies may not be required to follow State water law in the development of water projects. We are referring to the concept of the paramount rights of the Federal Government which was established as law in the Pelton Dam and other recent decisions. We urge that the Congress of the United States promptly adopt necessary legislation similar to the principles included in H.R. 4567 and S. 851 which will immediately reaffirm the validity of State water law and require the compliance with it by our Federal agencies. We believe that until this action is taken by the Congress, these recent decisions will cast a cloud over many water rights and may even endanger the proper financing and utilization of California's water projects. Our people cannot afford to make large, long-term money commitments for projects which, because of this infirmity, may never be able to deliver the water for which they were built. Again, may we say, we believe that action on this problem is of utmost importance.

The next problem we call to your attention is our financial problems. In this connection, the Southern California Water Coordinating Conference is concerned about the timing of Federal appropriations needed to finance those portions of the State's water project which are a Federal responsibility. These appropriations need to be made early enough so that construction can proceed without delay. We also favor in principle such legislation as proposed in S. 13 authored by California Senators Thomas Kuchel and Clair Engle. As we understand this bill, it would enable the United States to cooperate financially with State and local public agencies in the development of multipurpose water projects where the major purpose of the project is to provide for municipal and industrial water. Under S. 13 the United States could make available to the States or local public agencies undertaking such water development projects the same amount of funds representing the Federal responsibility as would be invested or loaned if the multipurpose water project were to be built by an agency of the United States. We believe that with the State undertaking the comprehensive development of the water resources, that the coordination with Federal agencies could best be accomplished through the legislation proposed in S. 13. We, therefore, urge your favorable consideration of the principles of this bill.

In connection with the major water development projects mentioned above, there may be areas which will require financial assistance for construction of distribution systems or loans for construction of domestic water systems, and so forth. In this connection, we believe the existing programs of the Federal Government may be very helpful in aiding such cases.

In this connection we recommend and heartily endorse a bill similar to that which has been introduced by Senator Kuchel and Senator Engle, S. 13, which would permit the integration and coordination of the Federal program with the State water plan. We therefore urge your favorable consideration of the principles of this bill.

In connection with flood control, we point out the important problem that exists here in southern California and urge the Congress to provide Federal flood-control funds so that the program in southern California can keep pace with the tremendous growth which we are experiencing and expect to experience. Furthermore, here in southern California water is of utmost importance and many of the Federal flood-control projects could be integrated with water conservation. There is increasing need for better management of ground water supplies which requires operation of flood-control works to be coordinated. We therefore suggest that such possibility be studied and evaluated by your committee so that greater benefits may be realized from multipurpose operation of these flood-control projects instead of singly operated projects. In southern California we must put our water to optimum use. There are a few projects yet that can salvage water that is now wasting to the ocean. In this connection we urge you to give consideration to the fact that those local projects that can be built to conserve such water must have long carryover periods, as much as 18 years in view of the tremendous variance in the California weather conditions. Under such conditions there are a great number of flood control benefits realized in connection with our conservation practices. We therefore believe the financing of the flood control features of these multipurpose projects should be undertaken by the Federal Government.

Next, in connection with watershed protection we point out to you the tremendously important problem we have here in southern California. We urge that the Congress provide sufficient funds to the U.S. Forestry Service so that fire protection to the U.S. Forest Service can be adequate throughout the year.

Finally, in regard to the sewerage disposal, we endorse the program which Public Health Service now has for aiding those communities which are not able to finance the necessary and adequate works for sewerage disposal.

In conclusion, we point out that we have only noted some of the most important problems in our area and that these problems are vital to us and we would be pleased to attempt to furnish any assistance to your committee which would further this solution.

We thank you for the privilege of expressing our views at this hearing.

Senator KUCHEL. Mr. Bookman, I speak for the committee when I thank you for a very fine statement covering a number of matters which unquestionably will be the basis of discussion and thereafter recommendations by this committee.

I am glad, without trying to oversimplify, to tell you that I am in general agreement with what you recommend, for example, this regrettable difficulty in the field of law between the State government and the Federal Government. There is no question about it. We have had regrettable instances where the Federal Government has abrogated to itself without right the supremacy in the field of water and some legislation in this extremely difficult field is going to have to be laid down. I am a coauthor of one bill along that general line, and Senator Engle likewise is. I am inclined to think that the committee recognizes the urgency of that problem as well as the importance of the others you point to.

Thank you, sir.

Mr. Harold E. Blatz, the president of the California Association of Soil Conservation Districts of Ontario cannot be present. He has asked permission to file a statement with the committee in its Washington offices. That permission is granted and Mr. Blatz will be permitted to file such a statement.

Is Bert Smith here now?

Is Mr. Don Vial of the California State Federation of Labor, AFL–CIO, present?

STATEMENT OF DON VIAL, CALIFORNIA STATE FEDERATION OF LABOR, AFL–CIO

Mr. VIAL. Mr. Chairman, Senator Young, my name is Don Vial. I am assistant to the secretary-treasurer, Neal Hagerty, of the California Federation, AFL–CIO. I want to extend the apologies of both Mr. Hagerty and Mr. Pitts, our president, who were not able to make this meeting.

Senator KUCHEL. We are sorry they are not here. We are glad you are here.

Mr. VIAL. I am here to express the views of the California Labor Federation on some of the pressing problems which you are discussing today. Unfortunately, because of the pressure of events in our own office and our limited staff, we have not been able to prepare a statement in advance. However, we would request of the committee the opportunity to submit a written statement at a later date.

We believe that your visit to California at this time is most opportune because California truly is at the crossroads in water and power development.

There is no question about the fact that we have to go ahead.

At our recent convention in San Diego we pointed out the necessity of moving ahead with water and power development insofar as workers are concerned. In our actions in support of comprehensive multipurpose development of water resources in California we say we have been motivated by our firm belief that without water and power in the quantity and places necessary at the times of need and at prices which will permit and encourage individual and collective enterprise to both agriculture and industry, it is a foregone conclusion that California will neither be able to keep its growing population and labor force fully employed nor develop toward the ideal envisioned by her people. We do not, however, and never will sanction the concept that water resource development must proceed at any price. That is, if it means that we must surrender to the forces of monopoly in the development of those resources. We believe that the question of paramount importance in the minds of Californians is not whether we go ahead but how do we go ahead and how do we finance our many needs in water development.

I am not going to attempt to outline the needs because I am sure the Department of Water Resources has adequately handled this. What we all know is that we must have every penny we can get from the Federal Government, the State government, and from local agencies if we are to even think of approaching the problem of developing out water resources in this State. California, I think, has benefited tremendously from the generosity of the Federal Government.

We have the history of the CVP behind us in which we have witnessed the generous contributions of the Federal Government. We have seen the Federal Government take up the CVP when the State itself could not finance it. Out of that activity the Federal Government developed what was called the comprehensive Central Valley Basin plan. Unfortunately, we feel many of the units of that comprehensive plan have been delayed and shelved because of the lack of unity in our own State, on fundamental questions of policy which go with Federal development.

I don't think it is necessary to review the struggles of the forties, the struggles between competing agencies, the Bureau of Reclamation, the Corps of Army Engineers, the battles between ideology when the slogans were "We don't want flood control, we don't want reclamation in California." We want flood control. We know what happened out of those battles and how it has disrupted the Central Valley project development itself. In effect, in many instances we felt that the backbone of the CVP itself was broken by this dissension within the Federal agencies. In a very real sense this battle between agencies over policy which will govern our resources development we feel has shifted now into a battle between whether the agency developing should be the Federal Government or the State. This is unfortunate, as I pointed out, because there is no room for controversy over who should develop it, because we need both. And I think that it is understandable that this controversy should have shifted between the Federal Government and State development because in the State of California we have rightly gone into comprehensive resources development planning but we have done so without policy. We have done so in a policy vacuum. So that we have laid ourselves open to a great degree to interest groups seeking the most advantage in a particular resources development program. This we feel has happened to California and not necessarily to the advantage of the people in general and not necessarily to the advantage of comprehensive development in the State.

I would like to make brief reference at this point to a project that has been mentioned here a number of times this morning, and that is the San Luis project. This has been held up as a great example of cooperation between the State of California and the Federal Government, which we believe it should be. As both of you well know, we would not, the California Labor Federation were not among those who supposedly were in unity in supporting the project as it was drafted. On the contrary, we were among the leading groups which sought the amendment which was included in the Senate bill as the project was passed. In fact, we don't believe that the project could have gotten out of the Senate without that amendment deleting the exemption for the State deliveries under reclamation law.

We are going to continue, of course, to press our views on this issue in the House as the bill comes up because we believe that we are right on the issue. However, we do understand, and there is a real, fundamental, honest disagreement here, those who say that reclamation law should not apply in the case of the San Luis project as far as it applies to State service areas are concerned, and say it is a State problem. This is a firm belief just as we believe that it is a Federal problem, but if it is not going to be handled on the Federal level then it must be handled on the State level. This, of course, is the significance of the

lack of action on the State level thus far in failing to provide any policy direction on the distribution of benefits.

Senator KUCHEL. Has the Governor taken any position on that, Mr. Vial?

Mr. VIAL. The Governor has declared openly, and we are pleased with that of course, he said he is against any enrichment and these are problems that have to be investigated and he is not sure of the extent the enrichments are involved but if they do exist he wants to close the door. What I am saying is we have no legislative policy in this field and this vacuum in itself has encouraged to some extent the use of the State for building certain projects which otherwise might be built by the Federal Government and which might deliver water more cheaply in California for certain groups. We think this is tragic because we do not want to see our very scarce State money be used to supplant Federal aid when in fact it should be supplementing it.

Senator KUCHEL. If I may interrupt you there, because on the latter point I agree with you that we have to have, on the basis of principle, maximum Federal cooperation in the solution of this problem. I nevertheless most honestly regret that your organization was unable to find itself in agreement with the position which I have taken and which my colleague, Senator Engle has taken, because if we find that the San Luis bill is not going to be approved in this present 86th Congress, 2d session, commencing next January, I simply want to say that California's problems, for whoever represents us in the Senate and in the House, are going to be far more difficult than they have been in the past. Here we deal with a fairly sizable project which could have been entirely Federal in character and which also could be entirely State in character. We have, like everything else, a unique situation in our water development. We have a great Federal reclamation project in the Central Valley. Down here I also salute the great Hoover Dam which has done so much for us here. We have to, in this State, recognize the concept of having a Federal system, particularly in the Central Valley, side by side with the State system. It would be to the advantage of each system to cooperate in any storage reservoir, as it has been agreed from an engineering standpoint is at San Luis. I most devotedly feel that that part of the project paid for by the State storing water to provide the people of the State with that water, ought to be subject to the law of the State, and that unquestionably that part of the reservoir paid for by the Federal Government utilized to provide additional water to an enlarged Federal reclamation area should be governed by Federal reclamation law. And, as I say, it is a matter of most honest regret that we were not able to come into agreement. I must say that you stated the position very frankly and very forthrightly and I recognize the problem.

Mr. VIAL. We realize, Senator, it was a sincere difference of opinion in this case and we hold to our respective opinions. We still feel in this case there is a direct use of a Federal subsidy which should clear reclamation law. I think the point I am really trying to make here is, if this is not the case and if the Federal law should not apply, let's assume that, then certainly it is most important that California fill its policy vacuum at this point, because it leaves itself wide open for use

to the extent that Federal funds could become involved where they could be used otherwise.

Let's assume that San Luis project had been built or was being carried out now as originally planned, with greater delivery to the south and Kern County, as you know this is part of the Feather River program. We feel that since water could be delivered and probably cheaper with Federal interest-free money, the south, further south, that California cannot afford, because it has a policy vacuum to lay itself open, to allow itself to be used—to go without water—when perhaps the Federal money could be available if there was some unity in this State. We will never have unity in the State, Senator, as long as we have a policy vacuum in California. This, in our opinion, is going to seriously affect the future planning of the development of our resources in California. A number of witnesses said they are moving in the direction of developing policy in California and we want to help them. We are working with the California Legislature in this regard and we hope something will be developed.

Senator KUCHEL. I am sure you do. And I am sure you are. It is true that unless, and this is an oversimplification—our people and our leaders in and out of Government are able generally to agree on fundamental water policy—we will have compounded the difficulties that we face and which are almost upon us. I don't want to continue interrupting. You go ahead and proceed.

Mr. VIAL. I would like to add that we feel because the need for funds is of paramount importance and because we must actually have the unity in this State that is necessary to get maximum funds, we feel that in closing the policy loopholes we should be willing in California to maximize Federal funds to give the Federal Government those projects which have greatest economic and financial feasibility. Those projects which the Federal Government will construct and which will produce the surplus in the Federal Treasury.

This is the condition of Federal undertaking and it has been a condition thus far in the Central Valley project and we certainly do not want that to be blocked. Then we will feel that California proposes the policy vacuum can step in, in the general overall plan, and supplement the Federal undertaking.

We think, of course, as the League of Women Voters has pointed out, that there must be some unity within the Federal Government in developing itself in the various agencies that are involved.

I would like to close with one remark regarding the new approach which you and Senator Kuchel and Senator Engle have taken in, I believe, S. 13.

This is actually fundamentally different from what I have been proposing at this point. It seems to me that we have, because of our policy vacuum, pretty well split up the comprehensive Central Valley Basin plan at this point, with very little hope of getting many of its units authorized and California has now come up with its own water-development program, which is very fine. Now we are asking the Federal Government to give us the maximum aid possible in development of that program which we, of course, agree should be done. However, if we follow this approach, that California is to have its master plan and rather than having the Federal Government complete the various units of the CVP as has been proposed in its compre-

hensive plan in developing the hydrographic area, then this means in effect that we will be taking money piecemeal from the Federal Government for various projects in the State. We are wondering what this means for national policy. We know that if the Federal Government were given the opportunity or, with unity in this State, was encouraged to undertake and complete various units of the CVP, that it would do so in accordance with this national policy.

On the other hand, if the State is to build some of those units in the CVP as, for example, the Feather River unit itself, which was part of the Federal CVP program, if the State is going to do this and then ask for Federal funds in effect it will probably get less in the way of Federal funds because it is going to be limiting it to the nonreimbursables, but also, it will probably get those funds without Federal policy. We do not think that policy of the Federal Government should so easily be allowed to slip to the wayside. In this case we would encourage the Federal Government, if it is going to use the approach as proposed in S. 13, which we have no basic disagreement with, then we must again consider its national policy as it relates to those funds because we must remember those are funds in lieu of unit development.

Senator KUCHEL. If I may just interrupt you, I offered the amendment in the Senate Public Works Committee to provide for a flood-control contribution by the Federal Government to the Oroville Dam as generally contemplated in this California water plan. It was accepted by the committee and finally stayed in.

I must say that you give us an area which I think this committee ought to study. It is a bill that the two California Senators have introduced, and we are glad to have introduced it.

Mr. VIAL. We like the bill itself. I am just saying the policy.

Senator KUCHEL. Yes, and I think that should concern the committee. I was delighted to have several people and yourself indicate that you like that but you would like to have this committee dissect it and take it——

Mr. VIAL. We don't want it to be emasculation of Federal policy. I will be very frank to you.

Senator KUCHEL. Yes, sure.

Mr. VIAL. That is all I have to say at this time. I would like an opportunity to submit a statement in the future.

Senator KUCHEL. Senator Young.

Senator YOUNG. Do you have a State water commission or State agency that works with the Federal Government in determining which projects should be Federal or State, or both?

Mr. VIAL. We have in California the State Department of Water Resources, which I am sure is working with the Federal Government in many respects, maybe not as closely as it should. I think generally it has taken steps in the right direction.

Senator YOUNG. You mentioned some conflict where you didn't know whether they should be all State or all Federal.

Mr. VIAL. I say that the conflicts have developed because the State has allowed itself to be used in many respects to include, within their own development program, projects which otherwise would be constructed by the Federal Government as part of the comprehensive

Central Valley Basin plan except that policy must go with it that is not favorable to those, perhaps, who like to see it under the State plan, and this in turn involves the use of State money where we need Federal money and we need every benefit we can get from the Federal Government.

Senator YOUNG. Thank you.

Senator KUCHEL. Thank you very much, Mr. Vial.

George L. Henderson of the National Reclamation Association.

Mr. Henderson.

STATEMENT OF GEORGE L. HENDERSON, NATIONAL RECLAMATION ASSOCIATION, AGRICULTURAL RESEARCH COMMITTEE

Mr. HENDERSON. Mr. Chairman, and Senator Young, I am a consulting civil engineer, residing in Bakersfield, Calif. The National Reclamation Association, of whose agricultural research committee I have been chairman for a number of years, has requested that I present to you some of the thoughts of the association relating to agricultural research.

On the side, I was interested to hear the lady representing the League of Women Voters mention research and I think that is one of the big problems in the development of our water resources. It is objective research to determine the best uses of water.

The association, for the last 8 or 9 years, has taken a deep interest in such research and has urged a more realistic approach to the solution of some of the problems.

Early in 1958, the Agriculture Subcommittee of the Senate Appropriations Committee requested the Secretary of Agriculture to present to them the ideas of the Department of Agriculture concerning present research facilities and the need for additional research in the future. As the result of this request, the Secretary appointed a working group composed of representatives of the Agricultural Research Service of the Department of Agriculture, the Soil Conservation Service, and the land-grant colleges. This committee held hearings in many localities throughout the country, at one of which I presented certain recommendations on behalf of the National Reclamation Association. A copy of the association's statement is attached for your information, together with a personal statement covering other problems of agriculture.

Attached to the statement I am now giving you are copies of the statement that I presented in October of last year.

Senator KUCHEL. Very good, sir.

(The prepared statement referred to follows:)

STATEMENT BY G. L. HENDERSON

I would like to have the indulgence of your committee for a few additional moments only, to express some personal ideas relating to agriculture.

Secretary Benson, in his announcement of the appointment of your committee, provided for "the locations and dates of public hearings to be held in connection with a study of needs for soil and water conservation research facilities." What I am about to say goes beyond this specification.

For over 30 years, as an engineer I have been deeply involved in the water and soil problems of agriculture; but also, as a result of the interest I have been able to visualize the other problems agriculture is constantly exposed to. The mere fact that an ample supply of water on good soil will produce a crop

is not the final answer, by any means. The farmer's one ambition is, of course, to harvest a crop which has a market demand at a price assuring him of a profit. Otherwise, he has no reason to be a farmer, just as is the case in any other type of business.

Recently I have had access to a report prepared for the "President's Appointed Bipartisan Commission in Increased Industrial Use of Agricultural Products, by the Task Group on New and Special Crops," dated January 1957. I have also received copies of several bills on the general subject of this report, introduced during the last Congress, including a bill S. 4100, introduced by Senator Ellender for the Senate Committee on Agriculture. The bill, if enacted into law, would establish an agency in the Department of Agriculture charged with research relating to development of new uses, including industrial, for farm products, and new products to replace those in surplus.

Personally, I believe the recommended activity is one of vital importance to agriculture. Any proposed legislation of this nature demands careful study before passage. It would seem to me there should be an intimate relationship between the activities you are investigating with these hearings, and the suggestions contained in the report I have referred to, together with whatever appropriate legislation may be enacted in support of it. I believe there should and must be a close integration of the various aspects of research covering the broad field of agriculture, from the land to the ultimate consumer, to the end that a more stable farm community may be established. I am sure this is not a new thought to you, and in your various activities you fully recognize the need for proper cordination of all phases of agricultural research.

STATEMENT OF NATIONAL RECLAMATION ASSOCIATION, AGRICULTURAL RESEARCH COMMITTEE CONCERNING SOIL AND WATER CONSERVATION RESEARCH FACILITIES

The National Reclamation Association, whose interest and membership covers the 17 Western States, has long had an intense interest in soil and water problems of the West. It is likewise most strongly interested in the product of proper soil and water management, the crops marketed in the area. It is well known to the membership of your committee that a substantial portion of the foods and fibers required for the entire country come from this great area. According to the 1954 Agriculture Census, there were 29,500,000 acres of farmhand irrigated in the United States, of which 26,900,000 acres (91.2 percent) were in the 17 Western States. In the 15-year period 1939–54, the irrigated lands of the West had increased by 9,700,000 acres.

Industry, generally, has been responsible for increasing population trends in the West which proportionately are substantially greater than in the country as a whole. In the decade 1940–50 the increase in this area was 26 percent, compared to an 11 percent increase in the remainder of the United States. Since 1950 such trends have continued.

In 1951 the president of the association, Harry E. Polk, appointed an agricultural research committee to make a study of the soil and water problems of this great area. The committee made a thorough and extensive study of these problems. Contacts were made with each of the State agricultural experiment stations in the 17 States and likewise with the Federal research agencies. As a result of these studies, a comprehensive report was assembled, giving a listing of the major soil and water research problems in each State. The report was later summarized as Senate Document 98 of the 82d Congress, 2d session, 1952. The document did not give the detailed individual problems for each of the various States, but rather, more or less, a compilation of these into overall regional problems of the entire 17 Western States. Few if any of the original reports of the research committee are available. One, however, is attached in order that your committee may have it for review and study.

The major soil and water research problems in the West are about the same today as they were when this report was made. Therefore, we think the original report will serve your committee needs very well. The National Reclamation Association feels, however, there should be a different emphasis placed on these problems in one respect, than was recommended in the original report. While the recommendations made in that report were sound at the time, and basically still are of that character, it is increasingly more apparent that our soil and water resources are becoming of greater and greater national value, and warrant a more complete and intensive research program. While the original report recommended 1 major laboratory for all the 17 Western States, it is now evident the soil and water research problems are of such importance

and complexity, that in order to meet the pressing needs of today—to say nothing of the future—it is necessary to provide substantial research facilities in each of the major physiographic soil and water areas in the West. Not only are facilities required, but it is also necessary to staff each of these in such a way that efficient research can be carried out. Our committee believes the following areas are of major importance:

1. The Pacific Northwest States

In this area the problem of water erosion is of major importance, both on irrigated and dryland areas. In addition to this, the entire problem of water management is one that needs intensive investigation. Many areas of the Columbia Basin are already being threatened by drainage and alkali problems. Drainage and water management problems are also important in the area west of the Cascades.

2. The Far West

In California alone there are over 7 million acres of irrigated land. It is evident that by 1975 the acreage irrigated in California will be substantially greater. The other States in this area, such as Arizona, Nevada, and portions of Texas and New Mexico, are similarly affected. In this Far Western area there are serious problems relating to the physical control of water; the drainage of irrigated land, the recharge of underground aquifers; and the improvement in the understanding of soil-water-plant relationships.

3. Upper Colorado River Basin

This area is composed of parts of the States of Utah, Colorado, Wyoming, and New Mexico. Considerable reclamation development is now taking place in this basin and will continue in the future. The major problems on the older irrigated lands and new irrigated lands in this area are associated primarily with those of efficient use of irrigation water, the problems of soil penetration, the removal of salts, and a somewhat lower level of crop productivity because of altitude and climate. Salt and drainage problems are prevalent in many regions. This area is also troubled by the extreme chlorosis problems found on many of the high cash crops such as fruits and vegetables. To date little or no concentrated research is being conducted in the area on these major problems. There is a real need for major facilities which could concentrate on the soil, water, and other problems in this important area of the country.

4. The high mountain areas

A large portion of the cattle industry in the western part of the United States is dependent upon high mountain areas, both for summer range and also for winter feed. The mountain meadows which produce winter feed are in most cases the limiting factors in ranching in these high elevations. The major problems in the meadows are those of water management, with the associated problems of fertility, desirable species, and time of cutting. In nearly all the mountain meadow areas in the Western States, the problem of water management is one that has received little or no attention. The heterogeneity of the soil and degree of slope in many cases make it appear to be uneconomical, from the standpoint of leveling or surface treatment, to get uniform water application. Consequently, most of these areas are flood irrigated throughout the season. In many cases, only water-loving species can tolerate the high water level of the submergence which takes place under normal farmer practice. Isolated research in several of the high mountain areas has shown that the usual one-half to 1 ton per acre of native hays can be increased to 4 to 5 tons per acre of good hays through proper water management, fertility level, time of cutting, and the introduction of adapted species. Research facilities are needed in order that these problems can be studied from the fundamental standpoint, and with proximity to areas where the results of such studies can be applied in the field under rancher operations.

In the discussion following related to the Great Plains, our association can speak only for that portion of the plains lying west of the easterly boundaries of the Dakotas, Nebraska, Kansas, Oklahoma, and Texas.

5. The Great Plains

(*a*) *The Northern Great Plains;* (*b*) *The Central Great Plains;* (*d*) *The Southern Great Plains.*—While the problems throughout the Great Plains are somewhat similar, the area is so large, the climate sufficiently different, and with

soils varying so greatly, that each of these specific areas represent major physiographic units and problem areas. The primary problems, however, in the plains resolve themselves generally to those concerned with moisture conservation, efficient use of water through irrigation, wind erosion, and deterioration in soil productivity.

For example, despite the fact that most farmers in the Great Plains attempt to make efficient use of the rainfall they receive, a large portion of it is lost. Estimates indicate that about two-thirds of the rainfall in the Great Plains area is lost by evaporation alone. It is estimated that a partial saving of such loss, projected over the 10 Great Plains States, would have a value of many millions of dollars annually, in terms of crop production. Not only would this be of major importance in crop production and stabilization of the economy of the area, but it would do much to alleviate, if not completely solve, the wind erosion problem of the plains. Research is needed in this area not only on the basic aspects of moisture conservation and efficient use of water, but also on ways and means of reducing to practice in the Northern, Central, and Southern Great Plain areas the results of basic research. The plains area is one of the major areas of the United States. Yet year after year much of this area is threatened either by drought, wind, and water erosion, or a combination of the three. By and large, research is the answer.

(*d*) *High rainfall areas of the Eastern Plains States.*—High rainfall areas of the Eastern Plains States have been somewhat neglected as to a concentrated research attack on the many soil and water problems existing there. Problems in these areas are primarily those associated with water runoff and erosion, the maintenance of fertility, and the related factors of land forming, stubble-mulch farming, efficient use of water, and crop rotations. For example, in much of this area while it is known that stubble-mulch farming will tend to reduce water runoff and water erosion, it is the usual experience that such farming practices tend to reduce yield. This is quite different from areas farther west where residue maintained on the surface not only reduces erosion but also tends to increase yield. The reasons for the reductions are not apparent, and methods have not been worked out to provide a practical alternative. The problems in this area are many and varied and warrant a concentrated effort directed toward their solution.

Our committee recognizes that the areas listed above are somewhat general and that the exact number, location, and boundaries of each should be determined by competent State and Federal scientists. Your group has an important assignment, and we are sure will recognize the many problems submitted herein. We feel such facilities should be located so as to provide comprehensive and efficient research to the physiographic areas involved. Costs are important factors in any problem, but should not be allowed to overshadow the effectiveness of research. Soil and water resources are far too precious and research costs are too low in proportion to returns to allow anything other than need to determine the number, kind, and extent of research facilities and effort needed for solution of the problems.

Our committee recognizes there is a tremendous interest in the field of soil and water research. Attention has been called to the need for a large number of facilities throughout the western part of the country. It is our belief, however, that relatively large laboratories and facilities give much better results than smaller facilities, which pose the problem of continuing adequate appropriations, with relatively high overhead. In present-day research, industry is a shining example of the pooling of brains and costly equipment to produce the many technological improvements which affect our lives today. Agriculture has benefited from some of these improvements, but must within itself provide the answers to the many problems peculiar to it. It seems to us the same approach as used in industry is required—the concentration of brainpower and equipment in well-coordinated regional facilities to more effectively and efficiently accomplish the desired results.

In conclusion, it is felt that increased investment in research facilities will increase agricultural yields and income many times its cost, thereby assuring the farming communities of the Nation a more secure economy, which could not fail to affect other segments of society, ever increasing in numbers, which will require the products of agriculture in order that they may continue to enjoy healthful living standards and prosperity.

Mr. HENDERSON. The working group completed its study of the situation, and we were advised that in March copies of its report were presented to the Senate Appropriations Committee. This report is entitled "Facility Needs, Soil and Water Research," and is dated January 15, 1959. In summary, it recommends the establishment of various regional laboratories at an estimated cost of approximately $25 million, plus annual supporting funds for personnel and materials required. The National Reclamation Association is having copies of this document reproduced, together with a number of pages of testimony before the Senate committee relating to this particular report.

It seems to the National Reclamation Association that the soil and water research activities of the Department have suffered materially within the past several years, due primarily to increasing costs of materials and labor, as compared to a more or less fixed amount of available funds. We have learned that because of this particular situation some of the major projects of Agricultural Research Service have been abandoned.

The program or research, I believe you will all agree, should play an important part in the proper use of water for agriculture. Soil and water resources are far too precious and research costs are too low in proportion to returns to allow anything other than need to determine the number, kind, and extent of research facilities and the effort needed for solution of the problem. In present-day research, industry is a shining example of the pooling of brains and costly equipment to produce the many technological improvements which affect our lives today. Agriculture has benefited from some of these improvements, but must within itself provide the answers for many problems peculiar to it. It seems to our group the same approach as used in industry is required—the concentration of brain power and equipment in well-coordinated regional facilities to more effectively and efficiently accomplish the desired results. It is felt that increased investment in research facilities will provide a more efficient use of the water resources of the Nation.

The Department of Agriculture asserts it has ample authorization to implement additional research facilities. So far as the National Reclamation Association is concerned, this position is not questioned. However, the Department in its budget requests so far as we can determine has not included increased research facilities, to the end, as we see it, that soil and water research is gradually dying on the vine.

Hence, we believe the Congress should implement aggressive research by appropriations earmarked for specific purposes, in order that the program may be accelerated.

Thank you, gentlemen.

Senator KUCHEL. Thank you, Mr. Henderson. We are very glad to have your recommendations on this question of statutory capacity to engage in research and the problem of what the responsible agents do under such capacity.

Senator Young?

Senator YOUNG. I would just like to say to Mr. Henderson that I was greatly interested in your statement and particularly with regard to soil and water research. I have been the ranking Republican on the Subcommittee on Agricultural Appropriations for years and I can assure you that there is a deep interest and concern by this committee for the need of establishing more of these research centers.

I think that you will find in the next and succeeding Congress that we will move ahead even if we do not get budget estimates of the program.

Mr. HENDERSON. I think, Senator, it was as a result of questions by your subcommittee that the Secretary was requested to make this study and report back by a certain date. I think that that indicated that the committee was very deeply interested in the need for more research of that kind.

Senator YOUNG. We later ask that they give us a list of those which we would give the highest priority to.

Mr. HENDERSON. Yes.

Senator YOUNG. That list has been furnished.

Senator KUCHEL. Thank you, sir.

Is Mr. Jim Carr here?

FROM THE AUDIENCE. He is on his way, Senator.

Senator KUCHEL. Is Mr. J. G. Will, representing the State of Arizona, here?

Mr. Will, we are glad to have a citizen from our good neighbor State, with whom we have now and then a little friendly disagreement, but there is nobody that salutes the good people of Arizona more than the people of California.

STATEMENT OF J. G. WILL, REPRESENTING THE STATE OF ARIZONA

Mr. WILL. Thank you for that statement, Senator, and I want to say that we truly do have sisterly feelings toward our sister State of California.

Senator KUCHEL. You are a good neighbor, and now you may proceed, Mr. Will.

Mr. WILL. Thank you, Senator.

Just very briefly, all I wanted to do was to ask that the record show that Arizona will be welcome to present witnesses at the Albuquerque hearings. We are in a difficult spot. We find that the committee has no scheduled hearings in Arizona.

One of the great stream systems in which this committee will be concerned is the Colorado. You have had some testimony on the Colorado already. You will undoubtedly have more. We would like to present some because of this aspect, Senator, that 94 percent, approximately, of Arizona lies within the Colorado River Basin and some 100,000 square miles of our State lies within the lower basin, so we are very gravely concerned that you should have the full picture in connection with that stream system.

Senator KUCHEL. You are completely right. First of all, I will say to you here, Mr. Will, that your State may supply such witnesses as it deems appropriate at the hearing in Albuquerque, N. Mex., and in that connection I would like to have Mr. Schad——

Mr. WILL. Yes, sir.

Senator KUCHEL (continuing). Make himself known to you and then by correspondence that can be properly worked out.

Mr. WILL. Thank you very much, Senator. Let me conclude by saying that I am very happy that these great objectives are in such capable hands.

Senator KUCHEL. You are a good man, Mr. Will.

The committee will now hear Mr. James Carr.

STATEMENT OF JAMES K. CARR, CHAIRMAN, CALIFORNIA WATER COMMISSION

Mr. CARR. Mr. Chairman and members of the committee, my name is James K. Carr. I have been invited to speak to you today as chairman of the California Water Commission.

We are honored to have two meetings of your committee in California where water development is of such vital importance. We are especially pleased that our two U.S. Senators are members of this select committee.

It will be my purpose in the few minutes allotted to me to touch on some of the highlights on policy questions which are of importance to California. Times does not permit, nor do I think you want from me any detailed treatise on some of the many proposed policies that have already occupied a good deal of your time on this committee.

FUNCTION OF THE COMMISSION

First, just a word concerning the California Water Commission. It is an agency of the State government consisting of nine members appointed by the Governor on staggered terms. Its members represent all sections of the State and belong to both major political parties. In addition to its function in an advisory capacity to the Director of Water Resources, the commission does make recommendations to the Governor and to the legislature concerning various aspects of water development in the State. The commission represents the State before the Appropriations Committees of Congress regarding Federal water projects in California. Further, the commission recently has been vested with the statutory responsibility for jurisdiction and disposition of State water rights applications, which under State law control most of the now unappropriated water in the State of California. So, in this respect, it has a very heavy responsibility concerning the State's future water development. Also, the commission has, through recent legislation, been given the responsibility for approval of State loans and grants to local agencies under a so-called State small projects bill.

PROBLEMS TO BE DISCUSSED

In response to the invitation of your committee, I will discuss a few water policy considerations which affect California. They also concern most other States. I wish to emphasize two problems and mention others briefly. They can all be classified under these general headings:

(1) Federal financial assistance to States for projects which are primarily municipal and industrial in character, with Federal assistance on those costs associated with irrigation.

(2) Broadening of existing Federal flood-control policy to provide for financial assistance to non-Federal projects having flood-control benefits.

(3) Development of upstream resources through financial assistance from larger foothill or valley water projects.

(4) Recreational use of water projects, and other aspects of watershed management.

(5) Some unresolved repayment policy questions relating to repulsion of saline ocean waters in connection with Federal conservation projects.

Since your arrival in California you have heard a great deal of California's dynamic growth and its greatly accelerated and pressing need for development of new water supplies for agriculture, municipal needs, industry, and recreation uses. I shall not reiterate the growing need for water. A recent issue of a national magazine devoted an entire issue to some of the problems we are facing in California. Our growth problems are well known.

It should be pointed out that although California is a leading agricultural State, industry is now one of the dominant economic forces. There is no question that the water development demands created by the growing agricultural economy plus the water needs of industry are beyond the capacity of any single level of government to meet. California's water program, therefore, is and must be local, State, and Federal in character.

FEDERAL, STATE, LOCAL PROGRAM

The Federal Government has expended nearly a billion dollars in California water-development and flood-control projects in the last decade, but the task yet to be done will require investments that surmount even that total. The State of California has embarked upon a vast program estimated to cost $13\frac{1}{4}$ billion. A far more astronomical figure is the $4 billion estimated to have been expended on water development by local agencies, both public and private. Even in these days of inflated dollars, these are staggering figures. Equally astounding, however, are the needs for water development in the future. The State department of water resources estimates that in order to serve the State's 21st century needs, the present developed water supply must be more than doubled. In view of these needs for agriculture, industry, and municipal uses, I should like to comment briefly on some specific policies which, if adopted, would help solve our problems.

AID TO PROJECT FEASIBILITY THROUGH IRRIGATION LOANS

We respectfully ask the committee to consider recommending a national policy so that the Federal Government will extend its financial help to water projects that State and local agencies can construct throughout all of the 50 States. Such assistance would be in the form of so-called interest-free money on those parts of the project which are properly allocable to irrigation development. It appears that the Federal Government can extend its present policy of making available non-interest-bearing loans for irrigation development to States and local agencies and at the same time save money for the Federal taxpayers.

This conclusion is reached because local agencies do not usually have the high engineering, administrative, and overhead costs which are almost inevitable in connection with many Federal projects.

This is not a criticism of the men in the Federal agencies. It is a fact that we must accept. It occurs because of bigness in the Federal

Government. This unfortunate fact of high administrative cost was well documented in the House Interior Committee hearings held on H.R. 4397 in 1953. It appeared from those hearings that substantial savings could be made. This seems logical as the people who will repay the cost of the projects would be closer at hand. In short, the locally administered project is less costly than if constructed by the Federal Government. It follows that if the same amount of money could be loaned to State or local agencies to construct needed facilities, there would be less expense to the Federal taxpayers with the same national benefits. Assistance on the irrigation features with non-interest bearing funds would make it feasible to develop projects which would also serve industry and municipal needs.

The big gap in our national water policies is the lack of coordination between locally administered industrial and municipal water programs and the Federal programs to encourage irrigation and flood control.

ON SMALL SCALE NOW—SMALL PROJECTS ACT

I give you an example of a small project in northern California which points out how the Federal Government is bringing about very desirable water development because of this same policy on a small scale. We are asking that you consider extending it to the other States and making the amounts of money under it large enough to carry some of our major multipurpose projects.

The example I mentioned is the Georgetown Divide Public Utility District in the American River basin northeast of Sacramento. Most of the district's water is used for irrigation on potentially productive mountain lands. The district also serves the municipal and domestic water supplies for a small mountain area. It has been able to secure a loan under the Small Projects Act of 1956 (Public Law 984, 84th Cong.). The district has an almost fixed repayment ability made possible by the sale of some of its upstream water rights. Because the Federal Government is making funds available, interest free, for irrigation facilities, the district can build a much larger and more comprehensive project than if it had to use a large part of its somewhat fixed repayment ability to pay interest. The net result is this: The Federal Government is bringing about more complete development of the resources in this area than would otherwise be possible through private financing.

Extension of this same principle would make it possible for States with larger projects, and some large districts, to go forward with water development which would serve multiple uses, and at the same time keep the debt service on these projects within bounds from a financial standpoint. Legislation to extend this principle of the Federal Small Projects Act has, of course, been introduced. It is my understanding that both of our U.S. Senators from California have introduced such legislation. We respectfully ask that this committee seriously look into this proposal and reach some conclusion on the desirability of extending the very worthwhile Federal policy of granting interest-free loans to local agencies in keeping with irrigation benefits.

AID TO PROJECT FEASIBILITY FROM FLOOD CONTROL GRANTS

As a corollary to the assistance through interest-free money on irrigation development, we believe the Federal Government can apply a similar principle on flood control. I believe the city of San Francisco developed one reservoir which was made more financially feasible because the Federal Government assisted in proportion to the flood-control benefits on a nonreimbursable basis. This certainly is in line with the 100-year policy of the Federal Government that flood control is a Federal responsibility. This policy, we believe, should be broadened. It should be clarified so that even on small projects financial assistance to local and State agencies can be obtained wherever legitimate flood-control benefits are achieved in accordance with approved Federal standards.

REASONABLE INTEREST RATES ARE NECESSARY

We are not advocating that municipal water supplies, industrial water supplies or power developments should not pay their entire costs and repay it with interest. It is recommended that this committee, however, watch very carefully that our interest charges do not become so high that we automatically force some local agencies out of the game because of high interest on bonds. I am aware of one district in California where the local people are bonding themselves, developing a water supply which is beneficial to their community and to the State, providing new recreation areas, and at the same time developing power at less cost than it could purchase it from private utility steam plants. I point out, however, that if interest charges get too high along with rising construction costs, agencies such as these cannot compete and the Federal Government would lose the help it has received from local agency development. As I stated earlier, it has amounted to a figure of $4 billion in California.

RECREATION POLICIES NEED CLARIFICATION

Those are the major points. There are, however, a few others which I should like to touch upon very briefly.

Recreation has become a major industry in the United States, and much of it takes place on, around, in, or near water. Thus the problems of water development and public recreation are inevitably tied closely together.

In planning for reservoir projects, it appears that a master plan for recreation around the reservoir should be included in the project feasibility report at the expense of the project sponsor.

In cases in which the recreation benefits are purely local in nature, it is suggested that the necessary facilities be constructed and operated by a local agency. In cases where broad recreational benefits accrue, it appears that the facilities could be constructed or financed by the Federal Government as a nonreimbursable feature of the project. In either case, some charge should be levied against the direct recreational beneficiaries to insure that the users pay the cost. Water and power users should not be required to carry the added burden of financing recreational facilities and services.

There have been examples of California federally built reservoirs where recreation planning was not begun until the reservoirs filled,

thus creating chaotic conditions in sanitation, traffic, and policing. Recreational planning in the first report, I think, is essential.

WATERSHED MANAGEMENT IS VITALLY IMPORTANT

Somewhat related to the above point is the role of the national forests in the Federal and State water supply picture. This role is particularly important in California in that an estimated 35 million acre-feet of water runs off national forest lands. About one-fifth of California's area is in national forest land. It is estimated that 90 percent of California's hydroelectric power is developed from water originating in national forest land, and that more than 10 million people receive their water supply from national forest runoff.

I strongly recommend that the Federal program leading to sound watershed management be expanded and accelerated, not only in California but throughout the West where public land watersheds are involved. One phase of this, snowshed management, now is being jointly financed by the State of California and the Federal Government.

The principle of multiple use of our national forest lands for the purposes of water production, timber, livestock, mining, and recreation should be established more firmly. This would have a definite effect on national water programs.

UPSTREAM DEVELOPMENT NEEDS FINANCIAL ASSISTANCE

Another point in which the Commission has shown an avid interest is that of upstream development in the case of those Federal projects where the major works are in the low foothill area and benefit valley floor lands. I refer to expansion of the so-called Sly Park formula, in which the lower development, with its high benefit-cost ratio, helps finance upstream development which would be impossible without such assistance. There is ample precedent for such a policy in the legislation authorizing Sly Park unit of the American River division, Central Valley project.

Similar proposals are incorporated in the proposed authorizing legislation for the Auburn unit and also for the Folsom south unit of the Central Valley project.

SALINITY REPULSION REPAYMENT PROBLEMS

Finally, I should like to call attention to a long unsolved problem in connection with the Federal Central Valley project. This is the matter of repayment for salinity-control benefits to lands in the Sacramento-San Joaquin Delta. These benefits derive from releases from Shasta and Folsom Reservoirs. By the very act of supplying good-quality water to the Delta pumping plants of the CVP, vast areas of the Delta receive benefits in the form of repulsion of saline ocean waters from the delta channels surrounding rich farmlands. These benefits now are charged to the project irrigation water users. The power users are actually paying most of the bill.

Should these lands actually pay for the benefits received, or should such benefits be nonreimbursable? A third question could be posed, namely, if payment is to be made, should the Federal Government

supply such lands with a direct and separate supply in order to save vast amounts of water released from the reservoirs, which could be put to use elsewhere? The repayment problem for salinity repulsion is very complex and not an easy one to solve. Your committee should be aware of it as an unsolved Federal water-policy problem. What the Federal Government does on this difficult problem will certainly affect the State's own water program.

SUMMARY

In summary we would appreciate your consideration and, if possible, your recommendation to the Congress of Federal water policies which will—

(1) Encourage States and local agencies through financial assistance to construct major projects which have irrigation and flood control benefits;

(2) Provide for upstream development with financial assistance from larger associated projects downstream;

(3) Develop proper use of water projects for recreation and provide for multiple use of the valuable watershed lands under Federal jurisdiction, particularly Federal forest lands;

(4) Provide an equitable solution to the problem of paying for salinity control in the Central Valley project.

In closing I call your attention to the fact that California doesn't really have a water problem. The required water supplies exist. Like most other areas, California has a financial problem when it comes to water development. Therefore, it is in the field of economic and financial feasibility that progress must be made if we are to be sure future water needs will be met. This committee has a magnificent opportunity to point the way.

Senator KUCHEL. Mr. Warren Wegis; is he here?

Is there anyone here who desires to testify or to supply any statement for the record?

Mr. BOTTORFF. I have a statement that I have prepared for the purpose.

Senator KUCHEL. We will be happy to receive it, Mr. Bottorff. Come forward, please.

STATEMENT OF ALLEN BOTTORFF, CHAIRMAN, WATER PROBLEMS DEPARTMENT, KERN COUNTY FARM BUREAU

Mr. BOTTORFF. Mr. Chairman, Senator Young; I should preface this by saying that Mr. Warren Wegis is secretary of the Kern County Farm Bureau and it was he who wrote to you for this particular purpose to make this presentation.

Mr. Chairman, committee members, I am Allen Bottorff, of Bakersfield, chairman of the Water Problems Department of the Kern County Farm Bureau. We are affiliated with the California Farm Bureau Federation. Our local membership includes farmers and ranchers whose operations account for a very large share of the agricultural production of Kern County—third ranking county of the Nation, in point of farm-product value—and representing about 9 percent of the total farm-product value of all California.

At Sacramento your committee received the policy statement of the California Farm Bureau Federation. Kern County Farm Bureau and other California County Farm Bureaus participated in the deliberations which led to the adoption of the policies and recommendations contained in our State organization's statement. We fully concur with and support this statement.

One of our purposes in coming before you today—perhaps the principal purpose—is to stress the need for early, practical application of the policies and recommendations offered by our State federation. We hope to offer comments and suggestions which may aid this accomplishment.

Perhaps, unless we can explain something about the serious nature of the present water-supply situation in Kern County, you could not be expected to understand how intense our interest is in your present studies and their results.

We are aware, of course, that the State Department of Water Resources, as well as other agencies—Federal, public, and private—may furnish you with statistical information concerning California's water needs, including the various subareas.

We do not wish intentionally to duplicate such information, however, before going into the details concerning Kern County's water situation we do wish to share with you our perspective concerning the statewide situation. It is based on State-supplied reports, other available hydrological information, and personal observation. We trust it will reasonably coincide with such other information of similar nature that you may receive. Here are the statewide facts as we understand them:

The land area of California exceeds 100 million acres, of which valley and mesa lands (lands with a slope of less than 200 feet per mile) exceed 33 million acres. At present about 8 million acres are irrigated and ultimately about 20 million acres are expected to be irrigated. A little over 1 million acres are now urban, suburban, and industrial in their use, with ultimate use in these categories anticipated at more than 3½ million acres.

The present population of California exceeds 14½ million people—the 1980 population is expected to be double this number—triple by year 2000. More than half this population is expected to reside in the area south of the Kings-Kern County line. These projections (from the State's intensive aqueduct-route studies) are based on the assumption that adequate water will be made available where needed on a timely basis—water not alone for direct use of these increasing populations but also for the needs of the agricultural industry required to support them.

Further facts to consider are the present consumptive use of water in California for irrigation is about 20 million acre-feet annually, and more than 40 million acre-feet will ultimately be needed for irrigation each year. Present seasonal water requirements for urban, suburban, and industrial purposes are nearly 2 million acre-feet and will ultimately rise to over 8 million acre-feet. (Other miscellaneous uses now are about one-half million acre-feet each year and may be expected to exceed 1½ million acre-feet).

It is computed that the average seasonal, natural runoff for the State exceeds 71 million acre-feet, with variations of runoff in an

individual year ranging from a high of 135 million acre-feet (1937–38) to a low of 18,300,000 acre-feet (1923–24).

In many areas of the State vast—or, in some cases limited—quantities of water may be found in natural underground storage and are available by drilling wells and pumping. For instance, the U.S. Geologic Survey estimates the holding capacity of the underground, at levels from zero ground level to 200 feet, in the area of the San Joaquin Valley south of Stockton, at about 93 million acre-feet. Part of this quantity has already been pumped out. Ground water may be found in many locations of the State, including broad areas of the San Joaquin Valley, at levels below 200 feet—in other areas it may be found closer to ground surface. Water quality and the economics of pumping are principal factors in the use of this ground water.

While it is true these ground water resources do exist, it is also true that a large overdraft is accumulating; that is, the use from the underground greatly exceeds the replenishment, particularly in certain areas. During 1955 the statewide overdraft was estimated at 4 million acre-feet, and it is predicted that this overdraft will be about 10 million acre-feet annually by year 1965. As to specific areas, for example, the present annual overdraft in Kern County now exceeds three-fourths million acre-feet. In the Central Valley area known as the Tulare Lake basin, the total yearly overdraft, as early as 1955, was estimated as more than 2½ million acre-feet. In some areas, including productive areas in Kern, Kings, and Fresno Counties very deep pumping is required—in many instances, 500 feet or more—with the water table dropping at 10 to 25 feet annually.

Generally speaking, in the areas where serious overdraft now exists, substantial communities exist; and the agriculture of these areas contributes greatly to the total State and national economy.

These existing overdrafts have developed within the tenure of the Federal Central Valley project as a prime source of supplemental water. In the 21 years, since 1937 (when construction of CVP started), through year 1958, the total addition to the supply of water in the San Joaquin Valley, by virtue of diversions from the delta or deliveries from the Friant works by the Federal Central Valley project, has amounted in all to about 9½ million acre-feet; and annual deliveries are now in the order of about 1½ million acre-feet. These are creditable amounts but obviously far less than the State's growing needs. In fact, the large overdrafts that now exist in the San Joaquin Valley have grown to their present proportions largely since the Federal Central Valley Project was started.

Now, to take up the water situation in Kern County, and to put it in economic terms, here is the very serious fact we must admit: The present circumstances with respect to the available water supply and related water need in Kern County point to the probable loss of about one-third of our present agricultural economy in the foreseeable future unless new, supplemental water supplies can be procured—and such deliveries are needed very soon to arrest the attrition in this direction that has already commenced.

This situation says nothing about our desire, which we believe is natural, to be able to procure necessary additional water to permit the normal growth of this area; on a basis consistent with the expansion of population, and the increased requirements for food and fiber, anticipated statewide and nationwide.

As our statewide analysis indicates, we are fully aware that similar situations exist in several other important areas of the State. For instance, the midwestern side of the San Joaquin Valley in Fresno and adjacent counties just north of our own critical valley area is also critically short of water. It is obvious to us, at least, that the basic economy of these areas is seriously threatened by existing or impending water shortages. This economic danger, similar to that which exists in Kern County, extends to all parts of our State, and both can be harmful to the Nation's economy.

Therefore, to a large extent we speak for others, as well as for ourselves, when we say water-project construction, on a basis that is reasonably acceptable, and compatible with the responsibilities that must be accepted by water users in various areas of the state, is clearly needed now in California. Only by this means can these costly and perhaps tragic economic losses be avoided. This clearly calls for the assumption of certain responsibilities by the State, as well as other agencies, in addition to what may be afforded by the Federal Government. It also calls for a new look at the relationships that exist in this field.

We are sure that you are aware of the plan of the State of California to enter the project-construction field to serve a substantial share of the State's water needs. These include domestic, urban, and industrial needs, and also a substantial share of the agricultural water requirements of the State, particularly in the southern half including Kern County.

A large segment of Kern County's farm areas, particularly those urgently needing water, are, for the most part located within the State project service area. Land and urban areas of Kern County which could be served by the State project lie in the central-western, southern and eastern portions of the county. Our understanding is that water service to the greater part of these areas is beyond, or outside, any current activity or project planning by the Bureau of Reclamation, that might conceivably be of adequate assistance on a timely basis. Particularly is this true insofar as present or near-future water needs are concerned. As we understand it, considered Federal planning that might touch on such needs at this time is quite nebulous and distant, projectwise.

Needless to say under these circumstances Kern County has been looking forward to receiving supplemental water through the successful development of the State Feather River project, on which a good start has been made by the State.

Perhaps in contrast—and this is undoubtedly well known to your committee—for a number of years, the area known as the West Side—in western Fresno, Merced, and Kings Counties—has been looking forward to receiving a water supply through an extension of the Federal Central Valley project, if Federal bills are approved to authorize the proposed San Luis Unit.

As the facts have now been developed by the State Department of Water Resources and by the Federal Bureau of Reclamation, there is a good opportunity here to jointly utilize certain facilities required by each project, with financial advantage to both the State and the Federal Governments, with no disadvantage to the water users of either project or to the financial programs required, provided the State is permitted to fully manage its own water deliveries when contract-

ing with users in its service area, and the Federal Government to manage its deliveries in its service area.

Because Kern County's hope for an early water supply rests with the State project, you may readily understand why we have been so interested in the satisfactory resolution of certain basic problems relative to Federal-State relationships that have arisen under this circumstance. We have been deeply concerned with the possible effect of Federal San Luis unit authorizing legislation on the future financing, construction, and operation of the State project.

When it is also realized that, in the interest of receiving water on a timely basis, water users from our area, as well as other potential customers of the State project, have quite generally indicated their willingness to assume their equitable share of responsibility for the full cost of State project water, without subsidy, perhaps the picture becomes more clear.

It has been with full recognition of the potential future financial burden, that our organization has closely considered these problems, including the problem of how best to reconcile divergent views with respect to the role of the State, and the role of the Federal Government, relative to the proposed Federal San Luis unit, and to proper coordination of the Federal program with the moving State program.

From time to time we have offered our best considered recommendations to our representatives at Washington. The special concept relative to these projects developed by the Kern County Farm Bureau with the aid and assistance of all water-interested agencies in Kern County, is an example.

I would suggest that you might refer to the printed copy of "Statement of Purpose and Concept for Timely Development of the State Authorized Feather River Project and the Proposed San Luis Unit of the Central Valley Project," which is attached hereto. I do not propose to read it or go into it further than to have it referred to, and hope it will be included in the record.

(The document referred to follows:)

STATEMENT OF THE FEATHER RIVER PROJECT AND THE CENTRAL VALLEY PROJECT

FOREWORD

This concept for meeting the urgent water needs of south and west San Joaquin Valley and other California areas combines the advantages of State ownership and operation of the San Luis Dam and Reservoir and other main-line facilities as part of the State-authorized Feather River project as the initial unit of the California water plan, with the proposed Federal development of irrigation and other water service for the San Luis unit area as part of the Central Valley project.

It is believed that under the concept here to be set forth, water users in the San Luis unit area will receive equal service to any heretofore proposed. It is further believed that prospective water users of the Feather River project will receive timely and unimpaired service in line with existing and future needs. It is also believed that both the United States and the State of California can develop their respective works with advantage to both; with maximum opportunity for cooperation; with lowest possible costs for each under a practical plan of development; at lowest costs and with earliest deliveries to water users, with increased or more certain water availability.

A basic objective under the concept is immediate construction of facilities to make available surplus water in the delta to areas which need water at the earliest possible moment; followed by a larger construction program which will increase the quantity of water available for movement south on a firm and permanent basis.

In the operation of both projects it may be found that excess capacity or requirements exceeding capacity will exist from time to time, particularly in the early stages of project development. Under the concept here proposed, if the excess capacity of one of the projects coincides with the excess requirements of the other, it will be possible to utilize facilities of the one of the advantage of the other and vice versa.

The sequence of project construction by both the State and the United States could be affected by these factors. Both could cooperate toward meeting the urgent needs of the two service areas. The State could give high priority to construction of the San Luis Dam, forebay, and aqueduct from San Luis to Kettleman City, while Federal construction of the San Luis pumping plants and other major works required in the San Luis service area, plus distribution facilities in the area, would proceed. The State would also extend its facilities, as appropriate, for service to other FRP service areas which are in critical need of water. Then under the State-Federal agreement here envisioned, the available surplus water in the delta could be delivered through the Federal project's facilities as far as the State's San Luis reservoir, and there stored and further conveyed southward through State facilities to be used to meet the most urgent and immediate water needs of south and west San Joaquin Valley, in service areas of both projects.

Construction of other project features by both State and Federal agencies would be expected to proceed during this time in line with the buildup of water requirements along the line.

BASIC CONCEPT

The concept proposed and the premises upon which it is based are as follows:

(1) The Feather River Dam at Oroville, the San Luis Dam, and other principal features of the Feather River project shall be constructed and operated by the State as now authorized. Financing and completion of the Feather River project shall be assured by authorization of general obligation bonds to be sold only as required by the State's construction program and by making available other funds under appropriate reimbursement policies. Such other funds may be from special and general funds of the State; from those received from the Federal Government for flood control, fish and wildlife preservation, and recreation, where national interest and policy prevails; and from direct loans or other financial participation by the United States as may be authorized.

(2) The State shall construct as part of the Feather River project, the delta cross channel, the pumping plant at the delta near Tracy, the canal from that point to the San Luis forebay, and the state's pumping plant for delivery of water therefrom to either the San Luis Reservoir or directly to the FRP main south canal.

(3) The San Luis Dam and Reservoir, with appropriate forebay, and the main canal southward therefrom, shall be State owned and operated as features of the State-authorized Feather River project, with provisions by agreement with the United States, for usefulness to the Federal San Luis unit and other units of the CVP on an appropriate basis.

(4) The San Luis unit, consisting of features proposed by the San Luis report, with exception of the San Luis Reservoir, forebay, and main canal, shall be authorized as a unit of the Central Valley project (which includes the Trinity unit and other units) and shall be financially and operationally integrated therewith.

(5) The existing excess capacity of the Federal Central Valley project's Delta-Mendota Canal and Tracy pumping plant will be used primarily for movement of water from the delta for proposed Federal San Luis unit purposes.

(6) With the exceptions noted in (4) above, the remainder of the proposed major features of the Federal San Luis unit, which are primarily of specific value only to the San Luis unit service area and are estimated to cost about $160 million, shall be constructed by the United States; as likewise may be the proposed distribution system and other local works to serve the San Luis unit area, which are estimated to cost about $184 million; the latter to be contracted for by local agencies within the San Luis unit's service area. These major Federal works shall include the pumping plant and other required works in vicinity of the State's San Luis Reservoir to deliver water, moved to that point through the Delta-Mendota Canal to either the State's San Luis Reservoir for storage, or directly to the State's main canal, for use in the Federal San Luis unit service area.

(7) The Federal Central Valley project will supply or contract for power to operate pumps of the Federal San Luis unit.

(8) Rights to the use of water, in accordance with State law as required within service areas of the Federal San Luis unit and the State Feather River project, or reasonable assurance that such rights will be forthcoming, shall be established.

STATE-FEDERAL AGREEMENT

The concept of State-Federal relationship in the operation of adjoining and connecting State and Federal works under these premises is as follows:

1. An agreement shall be executed between the United States and the State of California to provide:

(*a*) The State shall receive through the facilities of the Federal unit water for storage in the State's San Luis Reservoir which will later be conveyed through the State's FRP main south canal to points of diversion where it will be received for distribution through federally constructed works, to water users in the San Luis service area. Water similarly provided may also be received directly into the State's FRP main south canal for delivery to the headworks of the Federal unit's distribution system. The State shall make an appropriate charge for the service of storage and transmission which shall include all costs involved, including capital costs, on a proportionate-use basis consistent with other FRP water deliveries.

(*b*) In the event other facilities of the State Feather River project are of service to the Federal San Luis unit or other units of the Central Valley project, the United States shall pay an appropriate service charge and/or an appropriate share of the operation, maintenance, and replacement costs in connection therewith.

(*c*) As the counterpart of this provision, in the event facilities of the Federal San Luis unit are of service to the State Feather River project, the State shall pay an appropriate service charge and/or an appropriate share of the operation, maintenance, and replacement costs in connection therewith.

(*d* Operation of the Feather River project for water service to areas as presently authorized shall proceed as planned by the State, with due regard in construction and operation of project features to provide for meeting the State's contractual obligation with the United States respecting the Federal San Luis unit.

OPERATING PROCEDURES

The two projects will physically operate under the above premises and agreement as follows:

1. Surplus water from the Sacremento-San Joaquin Rivers Delta will be picked up by pumps of both the CVP's Tracy installation and by the FRP's Tracy facilities, in proportion to the rights of each and by agreement in accordance with (*b*) and (*c*) above.

2. The surplus water in the delta will be firmed by the Federal Central Valley project and by the State's Feather River project, thus providing additional water for use within service areas of both projects in respective entitled amounts.

3. Water pumped by CVP's delta pumps will move southward through the Delta-Mendota Canal. That portion destined for use in the San Luis unit will be repumped through the new Federal San Luis unit pumping plant to either the State's San Luis Reservoir or the State's main south canal. Losses in storage and transmission of this water shall be properly considered.

4. Water pumped by the State project's delta pumps will move southward through the State's Delta-San Luis Canal. At San Luis this water will be repumped to either the reservoir for storage and regulation or to the FRP main south canal for transmission to the State's Feather River project service areas, with losses in storage and transmission to be properly considered.

(The foregoing "Statement of Purpose and Concept" was originally prepared and approved by the Kern County Farm Bureau on the premise that it offers a basically sound, fair, and workable plan to cooperatively meet present critical water needs and anticipated increasing future needs of the areas concerned; with earliest protection to human life, greatest benefit to the general welfare, and assurance for maintaining and extending the agricultural and general economy of the State; with recommendation that it be given general consideration on its merits.)

This concept, now generally called the Kern concept, outlines in the clearest terms we could muster a desirable, model working arrangement for side-by-side State and Federal water-projects development. We have felt that it could well serve as a national pattern for cooperative, coordinated water development.

We were joined in our enthusiasm for this concept by responsible organizations and agencies, including statewide organizations such as the Feather River Project Association and our own State Farm Bureau Federation. This concept has been favorably regarded by State and Federal officials, as well as by many State and Federal legislators.

I might point out that this concept has been deemed to be entirely compatible with S. 13, which has been proposed by Senator Kuchel and Senator Engle. In fact, our own Farm Bureau Organization, by resolution, has been on record in support of S. 13 as a proper application of principles.

All of the principles of the Kern concept were fully incorporated in House bill 9969, to authorize the Federal San Luis unit, introduced in 1958 by the Representative from our district, Congressman Harlan Hagen.

Two of the important points of the concept, as translated into legislative language in Congressman Hagen's bill, are as follows:

SEC. 5. The United States, acting through the Secretary, may contract with the State to store or transfer water through facilities of the Central Valley project for ultimate delivery by the State, provided that only the excess capacity of the Central Valley project beyond other requirements existing at the time shall be so used and obligated, and the State shall pay to the United States a service charge or an appropriate share of the construction, operation, maintenance, and replacement costs of the facilities so used. The Secretary is also authorized to contract with the State to store or transfer water through facilities of the State for ultimate delivery by the United States, and the United States shall pay to the State a service charge or an appropriate share of the construction, operation, maintenance, and replacement costs of facilities so used.

SEC. 9. This language incorporates principles of the concept.

Subject to the requirements for coordination of operations in accordance with the agreement entered into pursuant to sections 3 and 4 of this Act, operation and control of the works of the San Luis unit shall be by the United States and operation and control of the State San Luis works shall be by the State. The provisions of the Federal reclamation laws shall not be applicable to water deliveries or to the use of drainage facilities serving lands under contract with the State to receive a water supply or to dispose of drainage water.

These sections, as well as other terms of Mr. Hagen's bill, were designed around the central idea of coordinated but separate Federal and State projects, working together through a mutually negotiated contract.

Parenthetically we are also pleased to say it was our privilege to work with Senator Kuchel, Senator Engle, and others interested at Washington during March, this year, with respect to current Federal San Luis unit legislation.

In fact, the work in cooperation goes back quite a bit further than that. We believe it may correctly be said that some of the basic points of this concept found their way into the language of the bills now under consideration by Congress.

We are most hopeful that such points may be fully retained in any finally approved Federal legislation for this project. Both the Federal and State projects could thereby move forward on a reasonable

basis. We would emphasize our belief that the particular principles involved are basic to the success of the State water-development program, on the timely basis necessary.

We would hasten to say that we realize that your committee today is here to receive public views and recommendations on national water policies. We have been talking about something that might seem to be local. But we believe that this concept qualifies for study from its national implication standpoint, and we hope that you will think in terms of its nationwide implications when you consider its details. This might be something like studying the atom in order to fully know the universe—but scientists say that's the best way to do.

Actually, we look around and ahead with you on the nationwide basis and see a great need for water-resources development in America. This need is growing by leaps and bounds and it will require, in our humble judgment, the finest possible cooperation and coordination of activity between all segments of government—local, district, State, and Nation— to adequately cope with it.

The California Farm Bureau Federation's many affiliated county representatives studies our Kern concept as well as numerous other ideas and suggestions that were developed from the grassroots; then, after boiling them all down, they emerged as the comprehensive policy recommendations set forth in Mr. Ray Hunter's statement to you yesterday.

We sincerely hope you will find it possible to include most, if not all, of the basic principles our State Farm Bureau Federation has called to your attention. We believe they will prove invaluble to the timely, economic, and fair development of the Nation's water resources in the future, with maximum benefit to all concerned.

Thank you very much for your considerate attention.

Senator KUCHEL. Thank you very much, Mr. Bottorff, for your contribution.

Any questions, Senator?

Is there anyone who has a statement?

Mr. LUTHIN. Mr. Chairman, I have a question to ask. My name is John Luthin. I am chairman of the California section of the American Water Works Association. That association in California is meeting on October 30 and at that time we may wish to prepare some statement and furnish it to your committee as a late-filed exhibit, or whatever you call it. Is that possible?

Senator KUCHEL. It will be received. I suggest to you by letter you contact the Washington office of Mr. Schad, the head of our staff.

Mr. LUTHIN. I will do that. Thank you.

(The statement furnished by the California section, American Water Works Association is as follows:)

AMERICAN WATER WORKS ASSOCIATION,
CALIFORNIA SECTION,
La Puente, Calif., October 15, 1959.

U. S. Senate Select Committee on National Water Resources:

The California section of the American Water Works Association is a section with some 1,600 members of a national association of persons directly and indirectly engaged by or associated with the water-utility industry. The membership includes representatives from virtually all water utilities, governmental agencies involved in water-supply matters, manufacturers of water-utility equipment and university and college personnel in the field of water supply.

This association, because of its corporate makeup, cannot take part in matters that might in any way be construed to be political in nature. It can, however, through resolutions and other actions of the executive committee or the membership at large, express opinions and desires which in effect would reflect the view of the entire industry. The major individual utilities and agencies in the State will, of course, be reporting directly to your committee as to their particular problems and needs.

The annual meeting of the California section will be held in Bakersfield on October 30, 1959, at which time the general membership will be informed as to the work of your committee and we may wish then to take some action with respect to answering the questions raised by your committee.

We would like to ask permission to offer, as a late-filed exhibit, the results of whatever action might be taken at our October 30 meeting. We will furnish this exhibit within 30 days after the meeting.

Respectfully submitted.

JOHN C. LUTHIN, *Chairman.*

Senator KUCHEL. Yes, sir. Now for the next witness. Will you give your name, please?

STATEMENT OF FRITZ MANGOLD, EXECUTIVE SECRETARY AND REPRESENTATIVE OF THE SPORTS COUNCIL, INC., LOS ANGELES, CALIF.

Mr. MANGOLD. Mr. Chairman, and members of the committee:

My name is Fritz Mangold, executive secretary and representative of the Sports Council, Inc., of Los Angeles, Calif.

Our sports council membership consists of the manufacturers, jobbers, distributors, wholesalers, and many retailers of sporting goods and recreational supplies and equipment. From the representative of the smallest fishing hook made to managers of sportsmen's shows, they are the members of sports council with headquarters in Los Angeles, the recreational capital of the world.

We are connected directly with the Sport Fishing Institute of Washington, D.C., the National Wildlife Federation, and the California Wildlife Federation; maintaining also contracts with the sportsmen's council and clubs of the State.

It is an honor to appear before this Senate hearing committee today, and bring you a few facts which may assist your committee in some small way to learn why we are so very interested in water resources and their relation on a national basis, for the recreation of the general public. The majority of the persons attending this hearing this afternoon are probably fishermen, or just enjoy the outdoors and water.

Therefore, we would like to present to this committee a few facts, bearing on the subject of recreational activities which directly concern water, or water and its multiple use. From the Sport Fishing Institute's minutes of their ninth annual meeting in Chicago on May 25, 1959, the following will be of interest to this committee:

The pressure on water at the present time is becoming one of grave importance, not only due to the domestic use by the increase in population, but because of the agricultural and industrial demands for water and more water. Then, we have the recreational use which is gaining each year at a pace which is phenomenal due to our extra days of leisure and shorter working hours; a phase of automation.

The need for water is great, but the need for clean water is even greater, when it is to be used for domestic purposes, for agriculture, and industry. It should also be of clean quality so it will contain the

flora and fauna needed for recreational fishing, and also be sanitary for boating.

There are now 36 States which have year-round or extended season for bass and other game fishing in all or most of their waters. Forty-five States now permit virtual year-round fishing for panfish. Nine States now have year-round trout fishing.

New fishing lakes were created during the past year at the rate of two per year per State; that is. in States having limited water. Some 60 new lakes have been added, bringing the total to about 800 lakes of the United States, making about 110,000 acres of new waters available.

Rehabilitation of old fishing waters has continued to increase. About 400,000 acres of fishing water have been improved to date by selective mass removal of the undesirable fish by using fish poison. Proving that all usable waters are being used instead of wasted by nonuse.

More closed water supplies have been opened. Nearly 200,000 acres of reservoir waters have been opened to fishing. In southern California we are very much concerned with the problem of opening more areas of reservoir water supplies to fishing on the same basis as they are opening closed water supplies throughout the Nation.

Through the efforts of Sport Fishing Institute the 1958 Congress appropriated $750,000 for the Corps of Engineers to start building needed facilities so that fishermen can better utilize the 3 million acres of water in completed engineered reservoirs.

A recent Gallup Poll shows 32 million adults, 21 years or older, fished at least once, which emphasized that sport fishing is the Nation's leading form of outdoor recreation. Last year the total of fishing licenses sold in the United States, according to the States reporting, exceeded 20 million licenses, an annual average of 4 percent gain each year.

From these facts you can readily see our interest in water. For the lack of water could certainly curtail recreational facilities in all areas of our United States and affect the national economy by several billions of dollars in the sports-fishing industry.

Another phase of the water problem with which we are concerned is the disposal of atomic waste into streams and the ocean waters, plus the regular domestic sewage and industrial sewage. The disposal of atomic waste into our coastal waters may in the very near future prevent us from reclaiming any water from these locations which have been used as receiving waters of atomic waste.

We believe that this Senate committee should investigate the atomic waste disposal with its relation to national water resources to its fullest extent and present your findings on this problem to guide the various State fish and game departments who would value such a comprehensive report; also to those of us who are interested and as a form of education to the sportsmen and general public. We wish to credit the Atomic Energy Commission with the splendid job it has accomplished to keep the atomic and radiation problem under strict control, but we do not like to think for one moment that the low-level atomic wastes may have a chance to build up and cause irreparable damage to our waters and the fisheries, and in turn be transmitted to the population of humans on the land.

We wish again to express our appreciation to this committee for giving us the opportunity of adding testimony toward the success of the committee's hearing in Los Angeles.

Senator KUCHEL. This is an interesting comment which you make, Mr. Mangold, and I am glad to accept it.

Mr. MANGOLD. I would like to emphasize that I appreciate your interest in the situation.

Thank you.

Senator KUCHEL. Thank you very, very much, Mr. Mangold.

Senator KUCHEL. Permission is given to the Chief of Water Resources for Ventura County to file a statement with the Chief of the Staff in Washington.

If there is no further——

Mr. ANDREWS. I wanted to make a statement, if I might.

Senator KUCHEL. Come forward.

STATEMENT OF LEON ANDREWS

Mr. ANDREWS. My name is Leon Andrews and I appear under the hat of a taxpayer. I think probably the best——

Senator KUCHEL. Very well. It is an important group in our society.

Mr. ANDREWS. I think first off I mean there isn't any question about the need for water in California. I don't think there is any question but what this committee is to be commended because of its interest in the water problems of California and the Nation as a whole. But I do think it would be wrong for this committee to leave California with an impression that all is well and happy here as far as the Feather River project will be. What I have in mind is and I think you know that there is going to be somewhat considerable opposition to the bond issue which is to rise next year. I think you ought to know the basis of this opposition. The committee needs to know that one of the first questions that would be asked is "Are we—in accepting the Feather River project—are we actually superseding the Federal Government's activity in flood control because the assumption is that the State will assume the cost of dams and flood controls and everything else. The project itself is in question as to its actual ability as to the amount of water you will be able to furnish to southern California itself. I think that would be quite a question for the U.S. Resources Bureau or the Engineering Bureau to investigate the actual amount of water southern California would receive from the Feather River project as presently conceived.

The third thing is, and there was a tremendous amount of investigation made into the power facilities necessary for bringing water through the State by the Feather River project and even in the assembly committee report on water there is a definite indication there will be a lack of power facilities on the present scene to supply sufficient water into southern California.

I would like to close with just the last part. That is the actual cost factors involved. I think the people of southern California have had an example of how we can't very well accept the cost figures as they are given right now.

Recently, the board of supervisors had a meeting with the Governor of the State of California, that is, the supervisor went to Sacramento and had quite a conference with the Governor, at which time they came back with the assumption and assurance by the government the bond issue would be $960 million was the sum involved. They very happily came back to southern California. They very happily had a session at the board of supervisors in which opposition to this figure was made public to the board of supervisors but in their haste to comply with the Governor's wishes $960 million was sufficient for the bond issue, they immediately passed a resolution that endorsed it. Within a matter of a week the evidence itself came out that while the Governor and the board of supervisors may have been in agreement there were factors in the senate in Sacramento; there were people there who were in complete disagreement and the figure was raised from $960 million to $1,750 million. I think if the honest figure were produced or forced out of some of these people we might have a different concept.

I want to close with this idea. California needs water very, very badly. There is not any question. We have got to do something about it. We have to move in haste because the years will grow on us faster. But to get a project started which in itself is not going to fill these particular needs, I think, is something wrong and I think the U.S. Senate in its review of these problems should make a pretty comprehensive study as to what is going on.

I would ask this committee as an end—actually, this is what brought me before the committee—if the committee would, as a committee and in their official capacity, please refrain from endorsing this Feather River project until we, the people of California, make our own decision as individual Californians; we don't care what you say.

Thank you.

Senator KUCHEL. Mr. Andrews, let me give you a little comfort in your last request. I doubt that the Constitution of the United States would authorize a select committee of your and my U.S. Senate to come out here and comment one way or another on the plan of the government of our State to spend money in this water field. There is a responsibility, I think, for this committee to make general policy recommendations on Federal-State relationships in this field, but you are speaking here today in your capacity and right as a taxpayer objecting to something that is essentially a State undertaking and to that extent I would doubt that this committee would have jurisdiction to make any comment on what the State government has proposed.

Mr. ANDREWS. I can only say, Senator, I am sure you are not unaware of the fact that members of this committee and I think it was Senator Kerr yesterday, whether he is a member of this committee or not, I am not sure, but Senator Kerr very definitely did, and when you make your recommendations, Senator, the public and the press are going to receive it as supposedly coming from the Senate committee and I would like to have that made clear to the committee. The Senate committee itself is not making the recommendations but individuals thereof as individuals.

This is all.

Senator KUCHEL. Thank you very much, sir.

Mr. ANDREWS. Thank you very much.

Senator KUCHEL. If there is no other statement I will declare this hearing concluded.

We are most grateful, we in California, to those senators from the other parts of the State who have come in here with us, both in northern California and in southern California.

I think this committee has a great opportunity to perform a constructive service for the country. I am sure that each of us on the committee is going to try to do just that.

Thank you very much.

(Whereupon, at 1:30 p.m., the committee adjourned.)

(Subsequently, the following statements were submitted for the record:)

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT,
Los Angeles, Calif., Ocober 27, 1959.

HON. ROBERT S. KERR,
Chairman of the Select Committee on National Water Resources,
Senate Office Building, Washington, D. C.

DEAR SENATOR KERR: In response to the invitation of Senator Clair Engle for this district to present its opinions on the Nation's water problems, the following statement is offered for consideration by the Select Committee on National Water Resources. Although the Los Angeles County Flood Control District is not directly related to water development, we are extremely interested in the water policies as they relate to flood control and water conservation because of our activities in these fields.

The district has and is continuing to engage in the functions of—

I. Flood control

A. By construction, operation, and maintenance of flood-control reservoirs and debris dams and basins;

B. By construction and maintenance of flood channels; and

C. By construction, operation, and maintenance of pumping plants.

II. Conservation of flood waters

A. By regulated release of storm waters from flood-control reservoirs to effect percolation in natural stream channels; and

B. By construction, operation, and maintenance of off-stream spreading grounds wherein storm and other waters are caused to percolate into ground-water basins.

III. Conservation of acquired or imported waters

A. By acting as the operating agent for water conservation zones in purchasing or acquiring imported or waste waters and causing such waters to percolate into the underground water basins for the benefit of such zones; and

B. By causing such acquired and imported waters to form a barrier to prevent further encroachment of sea water into the ground water basin of such zone, which encroachment causes degradation of the quality of the underground basin waters, rendering them unfit for normal use.

The past 15 years has been a period of drought and of unprecedented population and industrial growth which have enormously increased the demand for water and has seriously depleted the ground water reserves. This situation has intensified the district's activities in the field of water conservation in an attempt to stabilize the ground water reserves.

The current program in this District is, in part, one of cooperation with the Corps of Engineers, U.S. Army, and the Forest Service and Soil Conservation Service, Department of Agriculture, in which the major problems of flood control are resolved. These cooperative programs are mutually beneficial and have been highly successful in their field. In our opinion, however, considerable additional benefit would accrue to the public if the above functions were supplemented as follows:

(*a*) Conservation of storm waters could be materially increased if specific authority were given to the Corps of Engineers to operate its reservoirs in a manner which would further the conservation effort and still be consistent with

their primary function of controlling floods. The Los Angeles County Flood Control District operates its many flood-control and water-Conservation reservoirs for these dual purposes and finds that such operation is not only fully compatible but highly beneficial.

(*b*) Provide Federal sponsorship and aid for wide-scale applied research in solving techniques and economics of waste-water reclamation. The district and others have carried out some research on this problem as applied to sewage reclamation, but our studies are confined to conditions which prevail in this area, resulting in limited conclusions. Federal aid to broaden research in this field could cover a greater range of conditions and assist in developing criteria which could be generally applicable to this problem.

(*c*) Provide additional financial support to the local weather bureau office to enable them to furnish forecasts directed toward meeting the needs of local operating agencies and local agencies concerned with national defense. The Pacific coast area of the United States, because of its location with reference to weather movement, has the least warning of approaching storms of any place in the country. The network of reporting stations for approaching weather is essentially limited to Pacific shipping and to fixed weather ships, which provide broad information on air masses and frontal system movements, but no reliable warning of intense rainfall. The use of suitable radar equipment at strategic locations could materially assist in forecasting and providing warning of the approach of the intense portion of storm situations.

(*d*) Artificial cloud nucleation in its many phases would benefit from a comprehensive program sponsored by the Federal Government. The primary objective of nucleation, the production or increasing of precipitation, could be furthered on a nationwide basis with possible great benefits in the nation's water supply, particularly in the arid and semiarid portions of the country. In addition, other substantial benefits from hail prevention, lightning prevention, cloud dissipation, and similar phenomena could result from a concerted attack upon the yet unsolved problems attending artificial nucleation.

The district appreciates this opportunity to present its opinions on such a vital matter as our national water policy.

Yours very truly,

M. E. SALSBURY, *Chief Engineer.*

STATEMENT OF SAMUEL B. MORRIS, REPRESENTING THE DEPARTMENT OF WATER AND POWER, CITY OF LOS ANGELES

In response to an invitation from the Senate select committee, I am pleased to appear before your committee in behalf of the Board of Water and Power Commissioners of the Department of Water and Power of the City of Los Angeles.

The department of water and power is established in the charter of the city of Los Angeles to serve water and electricity for all purposes within the city of Los Angeles. It owns and controls its principal sources of water, hydroelectric and fuel-generated power supplies. It purchases water and some unused power from the Metropolitan Water District of Southern California, of which it is a founding member. Electric power is also purchased from the Hoover Dam and powerplant of the U.S. Bureau of Reclamation. The department cooperates with the cities of Pasadena, Glendale, and Burbank by the transmission to each of them of Hoover power over its high-tension transmission lines from Hoover Dam. The Department also has major electric transmission interconnections with the Southern California Edison Co. and the California Electric Power Co.

Annual capital expenditures of the department of water and power average $20 million per year for the water system. This expenditure is almost entirely for local storage, distribution and general facilities. Power system expenditures for the next five years will average an estimated $50 million per year, of which a substantial part is for additional generating capacity. This expansion of water and power is financed without any burden upon the general taxpayer by the issuance of revenue bonds, direct revenues, and some service charges accounted as contribution in aid of construction.

Roughly, 50 percent of capital construction costs are met by the issuance of revenue bonds. Since 1947 a charter provision prohibits the issuance of ad valorem bonds. All the costs of operation and maintenance, as well as bond servicing and other capital expenditures, are made from revenues collected from water and power sales. The credit of the department and of the city is good.

Accordingly, the city and the department are in position to meet the cost of water development and water distribution in our city. Approximately two-thirds of the water presently used by the city is transported by the Inyo-Mono Los Angeles aqueduct, which water produces en route annually a gross average in excess of 856 million kilowatt-hours of power.

The department of water and power financed and built its own 240-mile Los Angeles aqueduct to bring water from the Owens River. Water was first delivered from this source in 1913. Later, water from Mono Basin was brought an additional 100 miles into the aqueduct. This water, with local supplies, is sufficient for 2 million population. Los Angeles' present population is 2,400,000. The additional water requirements for this growing population are supplied from the Metropolitan Water District.

In 1928 Los Angeles joined with 12 other cities in forming the Metropolitan Water District of Southern California to bring water 300 miles from the Colorado River to this city. A bond issue of $220 million was voted in 1931, and water was first delivered in 1941. The Colorado River water is regulated by Hoover Dam, built by the U.S. Bureau of Reclamation, and the cost of which is being repaid with interest by the water and power users.

The district has expanded to include 86 cities from Los Angeles to San Diego and has a present population approaching 7 million. The district is now completing the expenditure of an additional $200 million to provide additional pumps, penstocks, and siphons to bring the Colorado River aqueduct up to its full capacity of 1,600 cubic feet per second, or more than 1,000 million gallons per day.

While Los Angeles' rights to this water, measured by payments on the capital account by taxes, are sufficient, with its other water sources, to meet its own requirements to 1985 or later, we recognize that the total capacity of the aqueduct will be fully utilized by the large membership of the district by about 1970–71. Accordingly, the city of Los Angeles and its department of water and power, with member public agencies of the Metropolitan Water District, are looking to the Feather River-Delta diversion projects authorized by the State of California in 1951, and for which a bond election for $1,750 million has been called for the general election, November 1960. In addition, $200 million of oil revenues of the State have already been pledged and future oil revenues will be devoted to State water development.

We understand the State of California has fully outlined this huge multiple-purpose water project to your committee. Accordingly, we will not describe it further here. We do wish to emphasize its great importance to Los Angeles and southern California, and the entire State.

Perhaps, you may ask why we are looking to the State rather than to the United States for such a large undertaking. First, we believe the service of municipal and industrial water supply, one of the major purposes of this project, is a local responsibility and should be paid for by those who receive the benefits. This has been the historic policy with us, as it has been with cities and local agencies throughout the United States.

Another important factor is that the State will assume a public utility type of responsibility of continuing to build sufficient works so that there will always be sufficient water at the Sacramento-San Joaquin Delta to meet all water requirements of the areas of deficiency whose demands will continue to grow, and thus permit areas of origin on initially developed streams to increase their withdrawals of water. The U.S. Government has repeatedly stated that it will build projects but it will not assume the public utility responsibility for developing water or power on time to meet growing demands. It has rightly said this is the responsibility of the States and local agencies.

California Senators Thomas Kuchel and Clair Engle have introduced S. 13 by which the United States may cooperate with the States and local public agencies in the development of multiple-purpose water projects where a major use is for municipal and industrial water supply. I should like to address a few remarks in support of this legislation.

Increasingly throughout the United States, domestic and industrial water supply is of growing importance which must be coordinated in the planning and development of drainage basins for their most economic use. Domestic and industrial water supply entities have historically paid their own way as local public or private agencies, and have not been aided by Federal or State subsidy. It is important to the general taxapayer that such policies be continued.

On the other hand, the U.S. Congress has been called upon to appropriate billions of dollars for navigation, flood control, irrigation and power projects. Current annual budgets for such are of the order of a billion dollars per year and yet it requires many years to complete large projects, as funds are not adequate to meet desirable construction programs.

In the past the States have not, themselves, been engaged in direct water resources development by financing, construction, and operating works. However, the State of California, as heretofore noted, is now embarking upon the construction of the $2 billion Feather River and Delta diversion project involving not only flood control, irrigation in the Sacramento and San Joaquin Valleys, and power, but also domestic and industrial water supply and some irrigation for southern California, the central coastal area, and the north and south San Francisco Bay areas, which are the major elements of the project. And $130 million of the total is allocated to local water projects. This will be the first major multiple-purpose water project under construction by any State.

The time is most opportune to inaugurate the proposal that the United States make available to States or local public agencies undertaking the construction of multiple-purpose water projects, the same amount of funds representing the Federal interest as the Government would invest or loan if the multiple-purpose water project were to be built by an agency of the United States.

The example afforded by assistance to the State of California, by making funds available to meet the Federal interest, when the State engages in the construction of its first multiple-purpose water project would be a great stimulus to other States to assume their proper roles in coordination and development of their water resources, and in preserving the precedent and policy that domestic and industrial water supplies will be developed by local agencies.

In the California State project we understand funds to cover the cost allocation for flood control at Oroville Dam, not to exceed $100 million may be provided by specific Federal appropriation, but could be authorized under such general legislation as S. 13, if approved.

S. 13 would be of general application and would include nonreimbursable grants for navigation, fish and wildlife, as well as for flood control. In the Western States, it would provide loans without interest for irrigation under reclamation law, and loans with interest for lands in excess of the 160-acre limitation, in the same manner as now provided in the "Small Irrigation Projects Act."

Under this bill, States and local agencies would carry the full allocated costs for municipal and industrial water supply and hydroelectric power for multiple-purpose water projects constructed by them, thus eliminating the necessity for any Federal appropriation for such purposes.

We urge your favorable consideration of the Kuchel-Engle bill, S. 13.

Another matter that should be discussed is that of threatened encroachment on State water rights by the Federal Government.

It has been the policy of Congress and of the several Federal agencies engaged in the construction of water use and water control projects to comply with local laws governing the appropriation and use of water resources within the several States.

However, on June 6, 1955, the U.S. Supreme Court handed down a decision in the case of the *Federal Power Commission* v. *The State of Oregon* (349 U.S. 435, better known as the *Pelton Dam* decision). In this decision it is held that in the withdrawal or reservation of Federal public lands, the United States retained jurisdiction over the use of water theretofore believed to have been granted to the State under the Desert Land Act and other related acts of Congress.

These Federal withdrawals generally antedated the Reclamation Act of 1902 and the construction of the major water projects of the Federal Government. This would appear to be a hazard to local and State water rights. The major portion of the water supply of the city of Los Angeles, the State of California, and of the Western States runs off lands in the ownership of the United States.

Accordingly, we support H.R. 4567, S. 851, and other bills similarly concerned with the laws of States with respect to water rights and the appropriation of water for beneficial uses.

We deeply appreciate the opportunity your committee has given us to present this testimony.

THE CALIFORNIA ASSOCIATION OF SOIL CONSERVATION DISTRICTS,

November 25, 1959.

Hon. ROBERT S. KERR,
Chairman, Senate Select Committee on National Water Resoruces, Senate Office Building, Washington, D.C

DEAR CHAIRMAN KERR: The California Association of Soil Conservation Districts is very much interested in the hearings your Senate select committee is conducting in regard to our national water resources, and our association is particularly concerned about what can be done to conserve this important natural resource in California.

For many years our soil conservation districts have been endeavoring to cope with the ever-increasing loss of precious water through excessive runoff due to an ever-increasing urban development and a continuous series of serious forest fires which leaves large areas naked of water-retarding ground cover.

The soil conservation districts and other agencies in California cooperating with the Soil Conservation Service are working with the basic idea of holding and conserving as much water as possible by upstream land-treatment measures. The land-treatment method has proven highly successful when properly applied to the land and should be encouraged as one of the basic approaches to this problem.

We in California recognize the value and importance of water and the necessity of conserving this most important natural resource. However, we have been handicapped in carrying on an extensive program due to lack of sufficient appropriations to employ the necessary technical assistance to apply this specialized land-treatment program.

It is the general opinion of our association that a substantial increase in appropriations to the Soil Conservation Service for additional technical assistance would be an advanced step toward a partial solution to this most important problem.

We wish to thank you and your committee for conducting these hearings and sincerely trust you are successful in formulating a program that will result in the ultimate solution to this water-conservation problem.

I would appreciate having the contents of this letter read into the record of your hearings.

Yours for better soil and water conservation,

HAROLD B. BLATZ, *President.*

STATEMENT BY ARTHUR L. DARSEY, CHIEF, CALIFORNIA DIVISION OF SOIL CONSERVATION

Mr. Chairman and members of the committee, my name is Arthur L. Darsey, and I am chief of the division of soil conservation in the department of natural resources. I am appearing before you today to bring to your attention the extent to which the State soil conservation commission and the division of soil conservation are participating in California's soil and water conservation program.

As you know, the population in California is increasing at a rapid rate. The statisticians have determined that the rate of increase is actually one new person every 55 seconds. This amounts to approximately a city the size of Denver each year scattered throughout the State. California's rapidly increasing population affects our agricultural enterprise in many ways: not only must these new people be fed, but they use up additional lands for purposes other than food production. Industries, subdivisions, schools, parks, highways, airports, etc., are necessary developments where increased population is involved. Unfortunately, most of the new developments are located on the best agricultural lands, simply because these lands also seem to make the best home and factory sites. In connection with the location of new freeways, it is our understanding that the State division of highways studies a large number of alternate locations and considers the value of agricultural land in making their final decision. Nevertheless, many of our new freeways and other highways take up a large acreage of good agricultural land, which is lost to crop production forever.

Our concern over the impact of increasing population on our rich agricultural land is geared to our interest in maintaining the basic productive capacity of our soils. Last year California produced over $2¾ billion worth of agricultural products, f.o.b. the farms and ranches, the highest of any State in the Nation.

This tremendous production, when processed into usable goods, represents an income to our State variously estimated between $8 billion and $11 billion.

Another facet to this problem of loss of agricultural lands which concerns the division of soil conservation is the annual loss by soil erosion from wind and water. As we suffer the loss of our better agricultural land to population uses, it becomes necessary for farmers to take up poorer, more sloping lands. Thus, the steeper land that is being put into production is also more susceptible to loss by erosion. In addition, the farmers are finding it necessary to attempt to cultivate flat alkali lands that have been used mainly for pasture in the past. Also, serious attempts are being made to cultivate some hardpan soils that have not been considered desirable farmlands. This moving on to steeper, alkali, or hardpan soils presents serious soil and water management problems to our agriculturists.

Recognizing these soil and water management problems, the legislature in 1955 passed senate bill 182, which stated in part:

"* * * the conservation of the soil is of fundamental importance to the prosperity and welfare of the people of this State. * * * Special effort must be made to speed up the present program of soil and water conservation in order to provide for permanent productive use of all remaining resources. To promote such effort, the legislature believes that the State must assume leadership in formulating and putting into effect a statewide program of soil and water conservation * * *."

Senate bill 182 (which is now division 9 of the Public Resources Code) further provided that this leadership be the responsibility of the State soil conservation commission, which has policymaking duties in this statewide program. The division of soil conservation is the administrative arm of the State soil conservation commission. Through this division, the State provides assistance to those people interested in forming soil conservation districts and assists soil conservation district directors throughout the State on nontechnical soil conservation matters. These include, among other things: Developing of districtwide comprehensive plans for soil and water conservation; promoting cooperators' interest in the district's program; extending district boundaries; encouraging the adoption of complete watershed development plans as needed; securing cooperation of other agencies; developing practical equipment management; preparing reports and publications; and explaining financial and fiscal procedures.

In addition to the problem that soil conservation districts and farmers have in connection with the loss of land by erosion from wind or water, there is also an ever-present hazard of floods. During the storm period of December 16–29, 1955, according to a report prepared by the U.S. Soil Conservation Service, our State suffered a loss of 14,890,907 tons of topsoil from 550,294 acres of agricultural land. These roughly half million acres of land were not all damaged permanently. The loss of the topsoil was a severe blow to these lands, but, with proper soil and water conservation practices, in many soil conservation districts these acres have been repaired.

This flooding of agricultural lands in small watersheds is not only a California problem, but for many years has likewise been a national problem. In 1954 the 83d Congress recognized this problem by the passage of Public Law 566, the Small Watershed Protection and Flood Prevention Act. We think Public Law 566 will prove to be one of the most vital instruments in combating loss of agricultural land from erosion and flood damage. This law includes the following language:

"It is the sense of Congress that the Federal Government should cooperate with States and their political subdivisions * * * for the purpose of preventing such (flood) damage and of furthering the conservation, development, utilization and disposal of water and thereby of preserving and protecting the Nation's land and water resources."

Public Law 566 places responsibility for selecting projects within the State on the Governor. In California the Governor has designated the State soil conservation commission as the agency responsible to carry out this function. The commission must recommend suitable projects and provide these recommendations with a priority.

As a result of California's unprecedented growth of population, agriculture, and industry, it now finds itself faced with highly critical water supply, flood control, and soil conservation problems. The financial stress of this growth demands that California capitalize on all available sources of Federal assistance. Recognizing this fact, the 1955 legislature provided for California's participa-

tion in Public Law 566 by appropriating funds for rights-of-way and relocation of utilities. The law requires such funds be secured from sources other than Federal. It was felt that California's participation in this phase would solve a funding problem at the local level and thus stimulate these projects in California.

By 1957 it became evident that rights-of-way contributions by the State were not sufficient to stimulate development of projects under this program at a fast enough rate. Investigation revealed that the planning phase was the bottleneck in California's ability to attract Federal funds to this program. Therefore, the legislature of that year authorized the creation of two planning units and necessary staff in the division of soil conservation to do project planning. The objective of the planning reports is to demonstrate to Federal authority that an economically justified project can be developed in a particular watershed. This is required before Federal assistance can be made available. This planning activity is time consuming; and results, through actual construction, are not evident for a number of years after the initiation of planning a particular project.

The lag between planning and construction is particularly evident in the history of the program in California. Although the Watershed Protection and Flood Prevention Act has been in effect since 1954, actual construction expenditures in California have barely exceeded $250,000 in any one year. In other States of the Union, smaller than California, annual construction expenditures have already exceeded $2 million.

Federal construction obligations in California for the 1958–59 fiscal year were $1¾ million. Thus, the total cumulative obligation in California is only slightly in excess of $1¾ million. The total cumulative watershed appropriation obligations nationwide are now in excess of $50 million. It has required 4 years of planning activity on the part of the Soil Conservation Service, together with 1 year of such activity on the part of the State division of soil conservation, to achieve the current construction program.

Until the 1957–58 fiscal year, all planning activity was carried out by the U.S. Soil Conservation Service. It will be noted that, shortly after the State began participating in the planning, projects were completed and construction authorized. With current authorized staffing, California will be supporting two-thirds of the total planning activity under this program.

As a result of policies formulated by the State soil conservation commission during 1958, the watershed planning section of the division must execute a staff function in connection with the commission's responsibilities to Public Law 566. This function involves assistance to sponsoring organizations in the preparation of applications for small watershed projects, in addition to the main job of planning watershed projects for soil conservation districts.

During the past fiscal year the staff has prepared reconnaissance reports on some of the applications which the commission had previously accepted. Now that the staff has gained about a year's experience, the commission has strengthened its policies by accepting applications only after the staff has determined the feasibility of proposed projects. Reconnaissance feasibility investigation at this early stage avoids submission of applications which might later be rejected to the disappointment of the local people.

The heaviest workload of the watershed planning section is the development of project plans for small watersheds which culminate in feasibility reports known as work plans. The watershed planning section works jointly with the Soil Conservation Service in developing these plans. To become eligible for Federal funds, the work plans are prepared in accordance with the criteria and regulations laid down by the U.S. Department of Agriculture.

Upon completion of a watershed work plan, it is submitted to the appropriate congressional committees for consideration. When a project is thus approved, Federal moneys are immediately appropriated for its construction. As of July of this year four work plans had been approved for California. Construction has been nearly completed on one of these, and the other three are in various stages of final design and contract negotiations preparatory to beginning actual construction.

Estimated installation costs on structural measures for these four watersheds total $15 million; benefits from the projects exceed $19 million. Of the $15 million, approximately $10 million is nonreimbursable Federal moneys. This is an excellent investment in terms of benefits received. For each dollar spent on installation costs, the benefit will be $1.30, or a 30 percent return on the investment.

Additional benefits are derived from land treatment measures for watershed protection. These on-the-farm conservation practices not only protect land but provide a high dollar return to the individual landowner applying them. Land treatment also helps to reduce downstream floodwater and sediment damage.

To date planning, by the division or with its assistance, has been completed on two projects; the division is participating in work plan preparation for five more. Reconnaissance studies have been conducted by the division on six proposed projects, and four more are being prepared. Six additional applications are awaiting reconnaissance studies. In addition to this workload, the division's program development section is currently assisting soil conservation districts with the initial preparation of 18 applications for planning assistance.

With the strengthening of the planning facilities in California described above, we feel that we will be able to more nearly meet the legislative intent of this authorization: that California receive its reasonable share of the moneys appropriatd under this law comparable to the percentage of the national revenues that are produced in California. It would seem that, inasmuch as California produces approximately 8 percent of the farm crops nationwide and inasmuch as it produces nearly 10 percent of the national revenues, it is only logical that somewhere around 10 percent of the moneys appropriated for small watershed projects be allocated to California. We hope that, with two State planning teams and one Federal team now actively working on small watersheds in California, we will accomplish this objective.

Another item of legislative accomplishment in the soil and water conservation program in California was a bill enacted into law by the 1957 legislature which added section 6816.1 to the Public Resources Code. This section provides that, commencing July 1, 1958, $100,000 annually be transferred from the State Lands Act Fund to the State soil conservation commission. The law states that from this appropriation the commission may make grants to soil conservation districts to assist them "* * * in carrying out any work that they are authorized to undertake whenever the commission determines that such work is necessary for the welfare of the people of the State * * *." This work may include: development of plans to carry out conservation works; establishment of demonstrations of soil conservation practices or measures; construction projects or application of soil conservation practices; and investigations or applied research on soil conservation problems.

The development of plans for conservation work has been given top priority in the rating system the commission uses to allocate funds because the commission feels that this type of work conforms with the only mandatory requirement of division 9 of the Public Resources Code that districts "* * * shall develop districtwide comprehensive plans for soil and water conservation * * *." By assisting on this phase, the integration of various conservation efforts will be accomplished. With this knowledge on hand, the local people can usually find ways and means of financing or carrying out the various projects that are under consideration. An example of development of plans carried out during the first fiscal year this fund was in operation is in the Georgetown-Divide Soil Conservation District in El Dorado County, where a study on the Scotch broom problem in the area was conducted by an expert in that field. A report on his findings was prepared showing how this problem could be solved, the estimated costs, and cooperative arrangements necessary to carry out the containment work.

The Upper San Luis Rey Soil Conservation District project in San Diego County is a good example of a demonstration project. This involved the clearing of 1 mile of the San Luis Rey River to demonstrate the saving of water derived from the elimination of riparian growth in the channel. The occasion for establishing this demonstration was to extend information developed at the San Dimas Experiment Station.

The commission made a grant to the Dixon Soil Conservation District in Solano County for construction of a drainage project. In carrying out this project, the district developed a cooperative project involving the county, the U.S. Navy, and the landowners in an agricultural conservation program pooling agreement. State funds helped to put the project over by filling in the gap where it was not possible to raise the additional funds locally. Interestingly enough, applications for construction and for application of soil conservation practices predominate in the requests for assistance from this fund. This indicates that a considerable amount of planning has already been accomplished in these districts, but the directors lack the means to carry out these plans.

Under the application of conservation practices category, the Florin Soil Conservation District in Sacramento County has developed an unusual program for improving land use in odd corners of fields and other areas which are not practicable to be used for general farming operations. This project is the conversion of weed breeding waste lands to areas that are attractive to wildlife. This program was developed by a district wildlife committee established in accordance with section 9268 of our law.

The Santa Maria Valley Soil Conservation District, located in Santa Barbara County, has used its grant to conduct an investigation on the technique for removing undesirable vegetation on ditch banks and replacing it with grasses that will not hamper the objectives of the ditch. This study is being carried out by the district as a cooperative project with the Agricultural Extension Service, county agricultural commissioner, Soil Conservation Service, and various interested local commercial concerns.

When passed by both houses of the legislature, this fund (referred to as the "Assembly Bill 1144" fund), amounted to $750,000 annually. Unfortunately, the Governor reduced this to $100,000 a year. Due to the fact that the fund was so drastically reduced, it has been necessary for the commission to deny a number of projects or to grant only a portion of the amount requested by the soil conservation district. To illustrate, 40 applications, totaling approximately $300,000, were received for grants from the 1958–59 allocation. In 1959–60, 39 applications for grants amounting to almost $250,000 were received. Applications for grants from 1960–61 funds have already been received from 26 soil conservation districts for a total of over $130,000. This means that the commission has been forced to reject over a quarter of a million dollars requested by soil conservation districts to carry out soil and water conservation works. In an effort to spread the benefits of these grants to as much of the State as possible, the commission reduced some request and spread others over several years, resulting in a slowdown of the conservation work that is needed.

I think it will be obvious to each of you that, unless the amount of this fund is increased, it will be impossible for the State soil conservation commission to fully carry out the intent of the legislature when it provided that the leadership in the soil and water conservation program in California should be a responsibility of the State soil conservation commission.

We recognize that California is now one of the leading States in our Nation in supporting the need for State participation in this soil and water conservation program. However, it is the goal of your State soil conservation commission and division of soil conservation to see this entire State covered by soil conservation districts so that, through the application of soil conservation practices, our good agricultural lands can be preserved and protected for the generations to follow us. Today 63 percent of our State is covered by soil conservation districts. It is our hope that, through the continued encouragement and assistance of the State legislature, we will be able to make this 100 percent as soon as possible.

Thank you for this opportunity to appear before you. If there are any questions you would like to ask me, I shall be happy to attempt to answer them.

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